Doc Ref: M103 Issue 3.6 Mar 2020

POWRMATIC®

HEM (NVx & SL)

User, Installation & Servicing Manual

Issue 3.6 Mar 2020

ErP COMPLIANT
SEPTEMBER 2018

POWRMATIC®

Certificate of Guarantee

This is to certify that this heater is guaranteed for two years parts and one year labour from the date of original commissioning. The heater must be commissioned within 4 weeks of installation.

To make a claim

In the first instance you must contact your appliance supplier, or installer and provide:-

1. The appliance type and serial number.
2. The original commissioning documentation. As much detail as possible on the fault.
3. Your supplier, or installer, will then contact Powrmatic to make a guarantee claim on your behalf.

Conditions of Guarantee

1. The heater must have been installed by a competent qualified installer, and in accordance with the manufacturer's instructions, building regulations and local regulations.
2. The heater has been professionally commissioned, within 4 weeks of installation, and a copy of the commissioning sheet returned to Powrmatic.
3. The heater has been maintained on a yearly basis by a competent and qualified servicing company.
4. The heater has been used in accordance with the manufacturer's instructions.
5. The correct specification fuel has been used.
6. No unauthorised repairs of modifications have been made. Powrmatic 'General Conditions of Sales' have been observed.
7. Except for the obligation of Powrmatic Ltd to perform warranty repairs during the guarantee period, Powrmatic will not be liable in respect of any claim for direct or indirect consequential losses, including loss of profits or increased cost arising from loss of use of the heater, or any event arising there from.

Exclusions

Consumables such as gaskets, ignition electrodes, flame rectification electrodes, fusible links, control batteries are all excluded from guarantee.

Powrmatic Ltd, Hort Bridge, Ilminster, Somerset, TA19 9PS
Tel: 01460 53535 **Fax: 01460 52341**
Web: www.powrmatic.co.uk **e-mail: warranty@powrmatic.co.uk**

Important: This certificate must be kept with the appliance

Failure to provide a copy of the commissioning sheet invalidates the heater warranty

Users, Installation and Servicing Instructions

CONTENTS

User Instructions

If the heater has not been left operational proceed as follows.

A) Checks before operating the Air Heater

The following preliminary checks should be made before lighting the heater(s)

a) Ensure that the ELECTRICAL supply to the heater is switched OFF.
b) Check that any warm air delivery outlets are open.
c) Check that the thermostat is set.
d) Check that the clock control is set to an ON period.
e) Check that any other controls are calling for heat.

B) Operating the Air Heater

1. Switch on the electrical supply at the isolator

2. If the Red Limit indicator lamp is illuminated, identify the limit stat, remove the black cap and press the reset button.

3. The startup sequence will commence. After a short delay the burners will light and the green 'ON' indicator on the front of the heater will be illuminated.

4. If the burners fail to light the control box will automatically restart the ignition sequence. If after 5 attempts at ignition the burners have still failed to light the control box will go to lockout and the Amber lockout lamp on the front of the heater (or on the low level remote reset, or MC200/MC300 if fitted) will be illuminated. To restart the ignition sequence depress the reset button on the low level reset for about 1-2 seconds.

WARNING: If it is not possible to light the heater after several attempts, contact the installer or local service company.

C) To Shut Down the Air Heater

1) For Short Periods:

Turn the room thermostat to the OFF, or set to 'Summer Mode'.

2) For Long Periods:

Complete step 1 above. Wait for 5 minutes and then turn OFF the electrical supply at the isolator.

D) Description of Operation

Important: The heater must NOT be controlled by switching ON and OFF the main electrical supply to it.

1) Standard Units

The ignition sequence commences each time the external controls e.g. Time clock, room thermostat etc. call for heat. The internal exhaust fan will run and, when sufficient combustion airflow is proved by the air pressure switch, the ignition spark will be generated, the main gas valve opens and the burners light. The heater fan must start a maximum of 2 minutes after the burners light. When the external controls are satisfied the burners will be turned off and the main fan is required to run on sufficiently to dissipate the heat from the unit. If the burners fail to light the control box will make another four attempts at ignition.

2) High / Low & Modulating Units

When the burners are alight, the heat output will be controlled either to high fire or low fire or, in the case of modulating units, to any point between high and low fire; depending on the requirements of the space being heated and the external controls fitted.

3) Overheat Thermostat

This operates if high temperatures within the heater are detected, the burners are turned off and a Red indicator switch light on the front panel is illuminated. The fault condition must be identified and rectified.

When the unit has cooled, push the Red indicator switch inside the front panel to reset the limit thermostat interlock relay, the red indicator light will go out and the unit is operational again.

Note: The limit thermostat(s) can only be reset once the unit has cooled down.
Unless the cause of the fault condition is readily obvious, for example a power cut whilst the heater was operating, a service engineer should be contacted.

E) Maintenance

To maintain efficient, reliable and safe operation of the heater it must serviced annually by a qualified person.

F) IMPORTANT

Free access must be maintained to and around the heater for servicing purposes and the air supply to the heater must not be restricted in any way. Combustible materials must not be stored adjacent to the heater.

If at any time a gas leak is suspected, turn OFF the gas supply at the meter and contact the local gas undertaking immediately.

All Powrmatic heaters use gas and electricity to power them, they may also contain moving parts such as pulleys and belts. It would be hazardous to tamper with or attempt to service unless you are a competent person in the field of Gas and Electrical work.

If you have any safety questions reference the servicing and installation of any of our heaters please do not hesitate to contact our head office for expert advice. Your safety is paramount to us.

Gas Safety (Installation & Use) (Amendment) Regulations

It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

1.1 Introduction

The HEM Range are gas-fired insertion heaters covering a range of heat outputs from 10.0kW to 200.0kW. They are certified for use on Natural Gas, Group H - G20**. Appliance Categories are Cat II2H (GB, IE). All units are CE certified and conform to all the European directives stated in section 1.3.1

HEM heaters are based on aluminised mild steel tube heat exchanger elements with each tube having dedicated inshot burners, a closed combustion circuit and have an internal exhaust fan, mounted downstream of the heat exchanger, to evacuate the products of combustion and draw in air for combustion, a fully automatic control for ignition, flame sensing, gas supply control and safety functions.

Standard units are for internal use and are supplied without a burner/controls housing for insertion into air handling units or duct sections. Each unit is fitted with a condense drain point from an all stainless steel exhaust box. Optional items include a room sealed burner/controls housing, T316 stainless steel heat exchanger tubes and units specifically designed for fresh air input and where condensate may be generated.

IMPORTANT

Service and Maintenance Engineers shall ensure that replacement items are fitted, adjusted and set in accordance with the data and detail set out in these instructions. If in doubt consult Powrmatic Technical Department.

Gas Safety (Installation & Use) Regulations 1998

It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

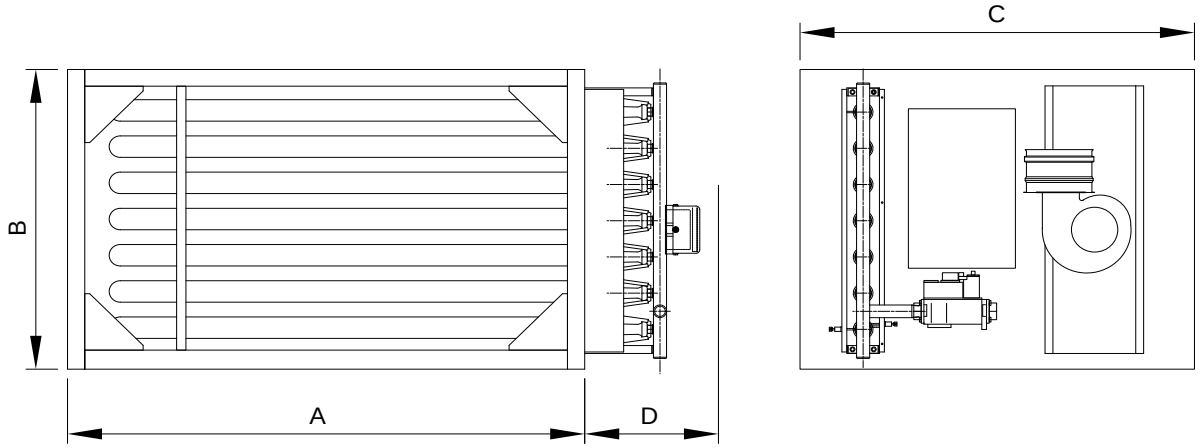
** LPG conversion kits available.*

Duties & Dimensions

HEM-NVx

Model HEM-NVx				10-3	15-4	18-5	25-5	30-6	40-8	50-6	60-7	75-9	100-12	110-13	125-15	150-18	175-21
Output	Max	kW		9.6	14.5	17.7	23.6	27.4	36.0	44.8	54.2	67.6	91.9	98.0	112.0	134.9	154.4
	Min.	kW		5.0	9.8	11.9	15.7	18.2	23.2	29.0	36.4	49.6	62.5	66.0	76.5	78.8	112.8
Temp	Rise	Δt °C		35													
	Air Off	Max	°C	70													
Airflow	Min. Airflow	m³/s		0.34	0.44	0.58	0.71	0.86	1.01	1.55	1.94	2.28	2.78	2.99	3.39	4.14	4.67
	Min. Airflow ΔP	Pa		43	26	45	32	47	31	59	67	59	54	43	43	47	45
Electrics		V/ph/Hz		1N/230V/50~													
	Current	A/pha		0.30											0.9		
	Power	kW		0.07											0.21		
Fuel Natural Gas	Connection	BSP/Rc		¾										1¼			
	Minimum Inlet Pressure	mbar		20.0													
	Rate	m³/h		1.09	1.72	2.09	2.77	3.22	4.18	5.26	6.52	8.10	10.92	11.62	13.37	16.27	18.40
Flue	Diameter	mm ø		80			100				130						
	Max Length Type B	m		14							16					3m max @ Ø130mm**	
	Max Length Type C	m		14*							16*					n/a	
Nett Weight (single units)		kg		38	45	53	60	68	74	91	114	123	140	145	168	195	230
Two Modules in Series Max Δt = 70°C	Heat Output	kW		19.2	29.1	35.4	47.2	54.9	72.0	89.5	108.4	135.2	183.8	196.0	224.0	269.7	308.8
	Min. Airflow	m³/s		0.34	0.44	0.58	0.71	0.86	1.01	1.55	1.94	2.28	2.78	2.99	3.39	4.14	4.67
	Min. ΔP	Pa		87	52	91	65	95	62	117	134	119	108	86	86	93	91

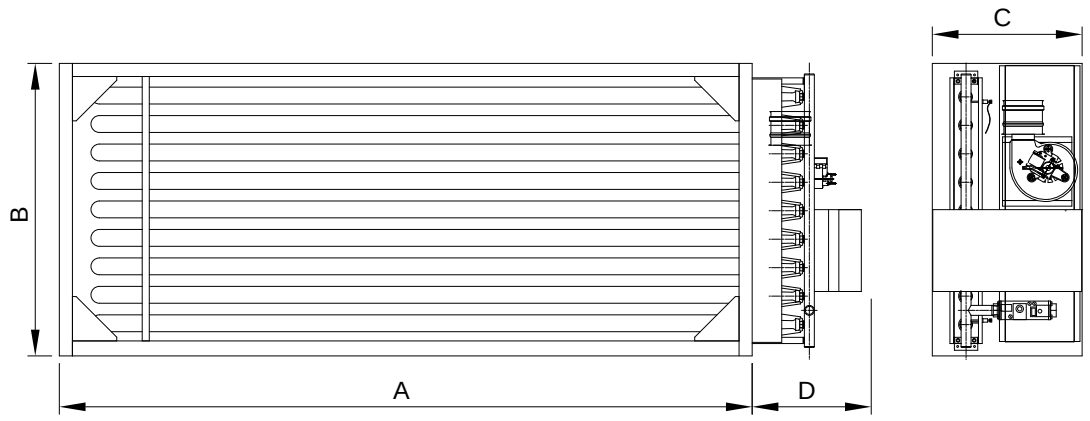
** length shown is maximum **calculated** length see section 2.1.4.2* *** see section 2.1.4.1 for longer flue runs*



Model	10-3	15-4	18-5	25-5	30-6	40-8	50-6	60-7	75-9	100-12	110-13	125-15	150-18	175-21
Dimension														
A	550	550	550	680	680	680	1050	1050	1050	1050	1050	1050	1050	1050
B	305	458	458	531	531	741	531	601	741	950	1132	1272	1482	1690
C	590	590	590	648	648	648	800	800	800	800	930	930	930	930
D	400	400	380	400	380	380	400	400	400	400	500	500	500	500
Flue Diameter	80	80	80	100	100	100	100	130	130	130	130	130	130	130

Model - HEM-SL				30-6	45-9	50-6	60-12	75-9	75-15	90-18	100-12	125-15	150-18	175-21	200-24
Output		Max	kW	27.0	40.5	45.0	54.2	68.5	67.5	80.4	88.7	116.7	135.7	160.8	178.3
		Min	kW	15.0	23.5	23.9	36.4	44.6	41.5	41.6	62.4	70.5	79.9	82.6	108.3
Temp	Rise		Δt °C	35											
	Air Off	Max	°C	70											
Airflow	Min. Airflow		m^3/s	0.97	1.45	1.61	1.94	2.42	2.42	2.90	3.23	4.03	4.84	5.64	6.45
	Min. Airflow ΔP		Pa	16	17	20	18	21	15	19	22	19	19	20	21
Electrics			V/ph/Hz	1N/230V/50~											
	Current		A	0.30								0.90		3.50	
	Power		kW	0.07								0.21		0.80	
Fuel Natural Gas	Connection		BSP/Rc	¾					1¼		¾	1¼			
	Minimum Inlet Pressure		mbar	20											
	Rate		m^3/s	3.35	4.76	5.29	6.52	8.15	8.26	9.59	10.31	13.76	16.22	19.43	21.81
Flue	Diameter		mm ø	100			130								
	Max. Length Type B		m	14			16						3m max @ Ø130mm**		
	Max. Length Type C		m	14*			16*						n/a		
Nett Weight (single units)			kg	59	85	79	118	106	139	165	130	185	204	235	265
Two Modules in Series Max Δt @ 50°C	Heat Output		kW	54.0	81.0	90.0	108.4	137.0	135.0	160.8	177.3	233.4	271.4	321.5	356.6
	Min. Airflow		m^3/s	0.97	1.45	1.61	1.94	2.42	2.42	2.90	3.23	4.03	4.84	5.64	6.45
	Min. ΔP		Pa	27	29	33	30	35	25	31	37	31	32	34	35
Three Modules in Series Max Δt @ 75°C	Heat Output		kW	81.0	121.5	135.0	162.6	205.5	202.5	241.2	266.0	350.1	407.1	482.3	535.0
	Min. Airflow		m3/s	1.04	1.56	1.73	2.08	2.59	2.59	3.11	3.46	4.32	5.18	6.05	6.91
	Min. ΔP		Pa	46	49	56	51	59	43	52	63	52	54	57	58

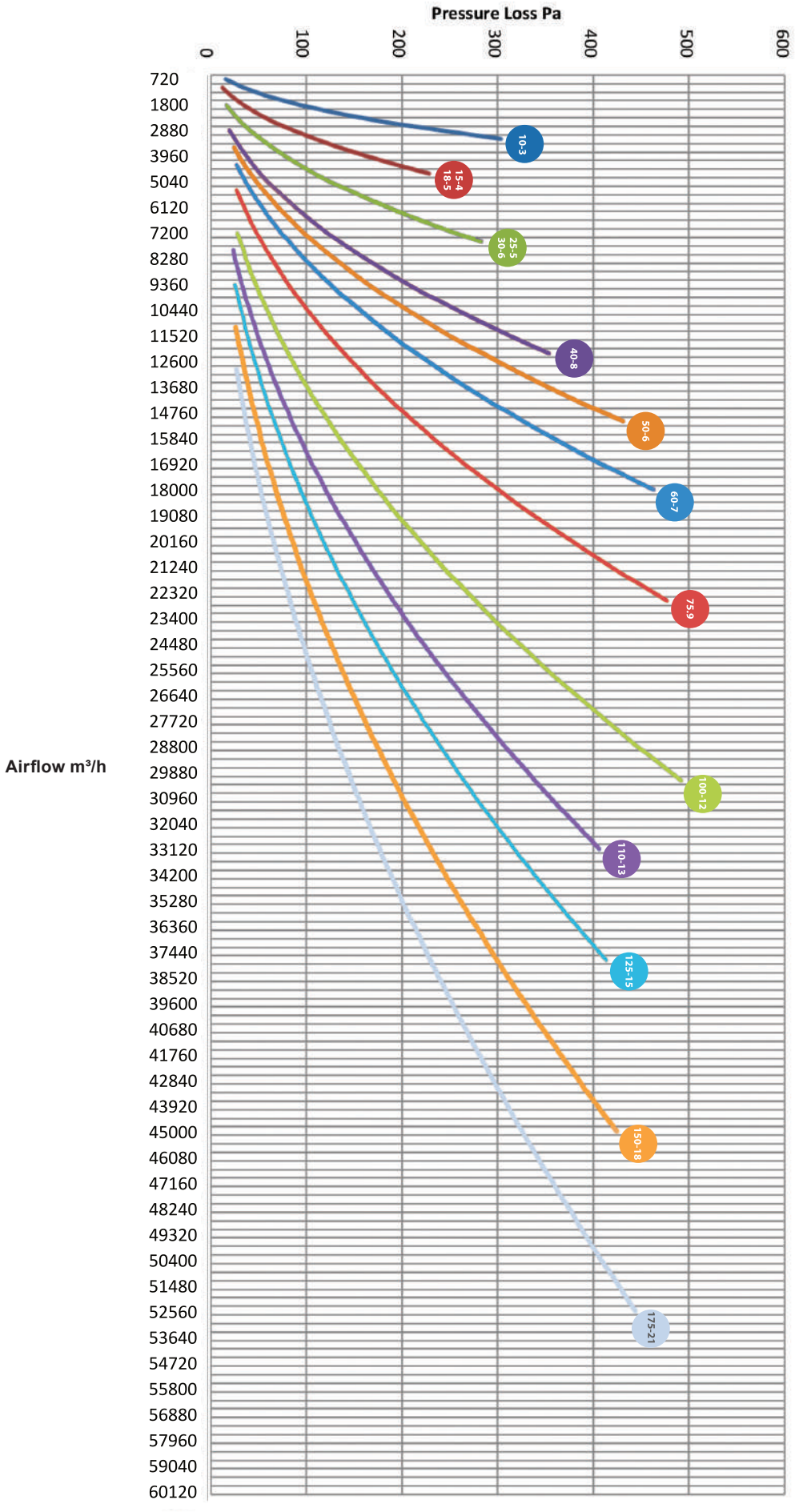
*length shown is maximum **calculated** length see section 2.1.4.2* ** see section 2.1.4.1 for longer flue runs*



Model	30-6	45-9	50-6	60-12	75-9	75-15	90-18	100-12	125-15	150-18	175-21	200-24
Dimension												
A	1250	1250	1850	1250	1850	1250	1250	1850	1850	1850	1850	1850
B	531	741	531	950	741	1272	1482	950	1272	1482	1690	1900
C	400	400	400	400	400	400	400	400	400	400	400	530
D	450	450	450	450	450	450	450	450	500	500	500	550
Flue Diameter	100	100	100	130	130	130	130	130	130	130	130	130

Pressure Drop Graph

HEM-NVx



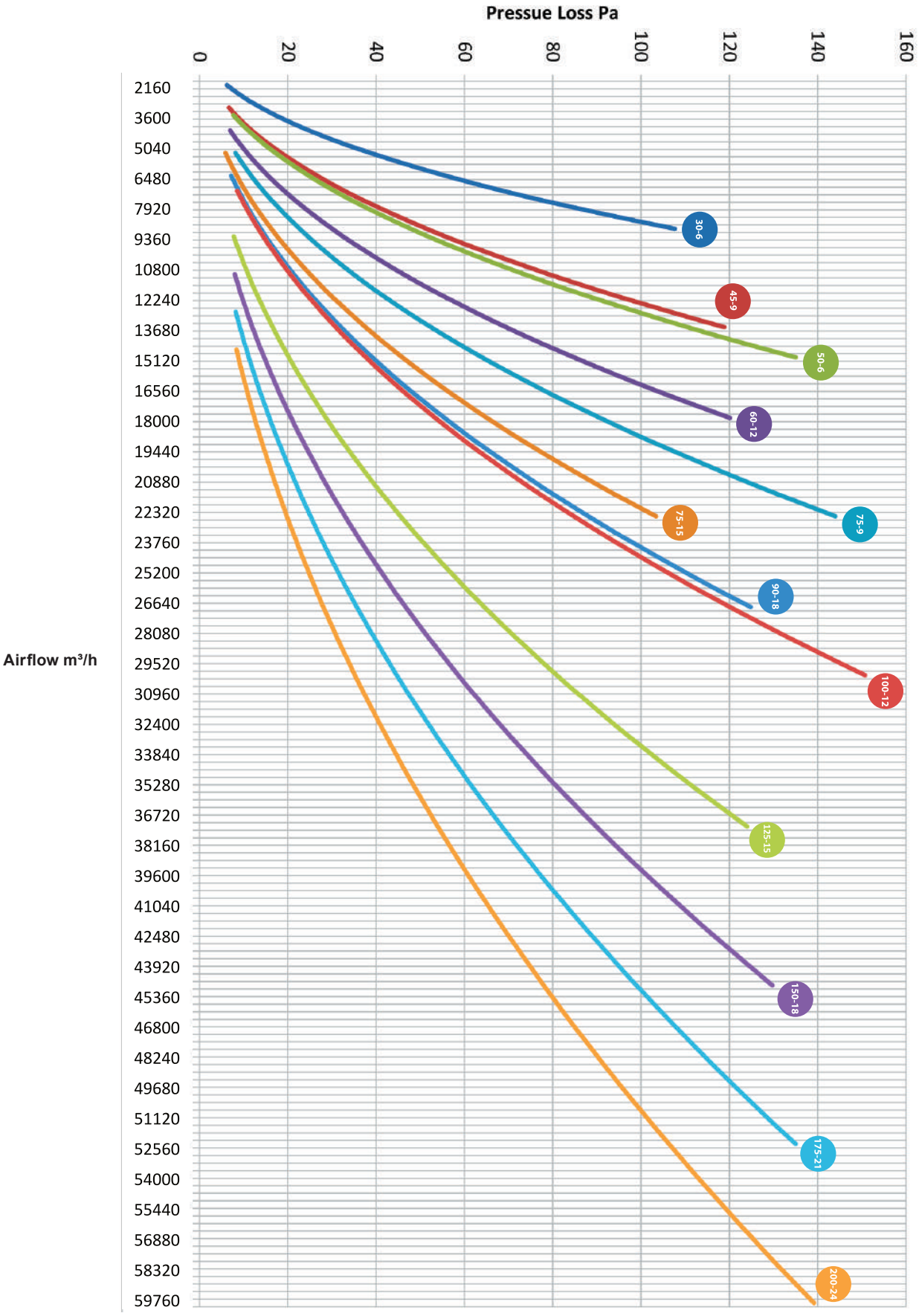
Note:

HEM NVx

The above data refers to a single module pressure drop. For twin models, refer to manufacturer.

Pressure Drop Graph

HEM-SL



Note:

HEM-SL
The above data refers to a single module pressure drop. For twin & triple models, refer to manufacturer.

1.2 Technical Data

Injector Sizes & Burner Pressures - Natural Gas - Group H - G20 Net CV (Hi = 34.02MJ/m³)

Minimum Inlet Pressure = 20mbar

HEM-NVx	Injectors			(Max)		(Min)	
				Burner Pressure	Gas Rate (nominal)	Burner Pressure	Gas Rate (nominal)
MODEL	No.	Size mm	Marked	mbar	m³/h	mbar	m³/h
HEMNVx 10-3	3	1.67	380	8.6	1.1	2.7	0.6
HEMNVx 15-4	4	1.67	380	12.0	1.7	5.0	1.2
HEMNVx 18-5	5	1.67	380	12.0	2.1	5.0	1.4
HEMNVx 25-5	5	1.94	500	12.1	2.8	5.0	1.9
HEMNVx 30-6	6	1.94	500	12.0	3.2	5.0	2.2
HEMNVx 40-8	8	1.94	500	10.3	4.2	5.0	2.8
HEMNVx 50-6	6	2.54	750	10.2	5.3	4.7	3.5
HEMNVx 60-7	7	2.54	750	11.3	6.5	5.0	4.3
HEMNVx 75-9	9	2.54	750	10.8	8.1	6.3	6.1
HEMNVx 100-12	12	2.54	750	11.4	10.9	5.0	7.6
HEMNVx 110-13	7+6	2.54	750	10.4	11.6	5.0	7.9
HEMNVx 125-15	9+6	2.54	750	10.8	13.4	5.0	9.2
HEMNVx 150-18	9+9	2.54	750	10.5	16.3	4.6	10.6
HEMNVx 175-21	12+9	2.54	750	11.0	18.4	5.0	13.3

HEM-SL	Injectors			(Max)		(Min)	
				Burner Pressure	Gas Rate (nominal)	Burner Pressure	Gas Rate (nominal)
MODEL	No.	Size mm	Marked	mbar	m³/h	mbar	m³/h
HEMSL 30-6	6	1.94	500	12.0	3.4	4.0	1.9
HEMSL 45-9	9	1.94	500	10.9	4.8	2.9	2.8
HEMSL 50-6	6	2.54	750	10.0	5.3	1.6	2.9
HEMSL 60-12	12	1.94	500	11.3	6.5	5.0	4.3
HEMSL 75-9	9	2.54	750	10.6	8.2	4.6	5.3
HEMSL 75-15	15	1.94	500	12.1	8.3	4.0	4.6
HEMSL 90-18	18	1.94	500	10.5	9.6	3.1	4.9
HEMSL 100-12	12	2.54	750	10.0	10.3	5.0	7.4
HEMSL 125-15	15	2.54	750	10.0	13.8	5.0	9.6
HEMSL 150-18	18	2.54	750	9.70	16.2	5.0	10.6
HEMSL 175-21	21	2.54	750	9.70	19.4	5.0	12.1
HEMSL 200-24	24	2.54	750	10.3	21.8	5.5	14.1

Heater Specifications cont - Natural Gas

HEM-NVx	High Fire		Low Fire		Min Air Flow		Weights	
	Input (Nett)	Output	Input (Nett)	Output			Module only	Packaging
MODEL	kW		kW		m^3/s	m^3/h	kg	kg
HEMNVx 10-3	10.3	9.6	5.6	5.0	0.34	1220	38	12
HEMNVx 15-4	16.3	14.5	11.0	9.8	0.4	1600	45	12
HEMNVx 18-5	19.8	17.7	13.4	11.9	0.6	2070	53	15
HEMNVx 25-5	26.2	23.6	17.8	15.7	0.7	2550	60	15
HEMNVx 30-6	30.5	27.4	20.6	18.2	0.9	3100	68	15
HEMNVx 40-8	39.6	36.0	26.4	23.2	1.0	3650	74	15
HEMNVx 50-6	49.7	44.8	33.0	29.0	1.5	5570	91	18
HEMNVx 60-7	61.6	54.2	41.0	36.4	1.9	6984	114	18
HEMNVx 75-9	76.6	67.6	57.7	49.6	2.3	8208	123	18
HEMNVx 100-12	103.3	91.9	71.9	62.5	2.8	1000	140	21
HEMNVx 110-13	109.9	98.0	75.0	66.0	3.0	10750	145	21
HEMNVx 125-15	126.4	112.0	86.5	76.5	3.4	12200	168	25
HEMNVx 150-18	153.9	134.9	100.2	78.8	4.1	14900	195	30
HEMNVx 175-21	174.0	154.4	125.7	112.8	4.7	16800	230	32

HEM-SL	High Fire		Low Fire		Min Air Flow		Weights	
	Input (Nett)	Output	Input (Nett)	Output			Module only	Packaging
MODEL	kW		kW		m^3/s	m^3/h	kg	kg
HEMSL 30-6	31.7	27.0	17.9	15.0	1.0	3492	59	15
HEMSL 45-9	45.0	40.5	26.3	23.5	1.5	5220	85	15
HEMSL 50-6	50.0	45.0	27.3	23.9	1.6	5796	79	18
HEMSL 60-12	61.6	54.2	41.0	36.4	1.9	6984	118	15
HEMSL 75-9	77.0	68.5	50.2	44.6	2.4	8712	105	18
HEMSL 75-15	78.0	67.5	43.6	41.5	2.4	8712	139	18
HEMSL 90-18	90.6	80.4	46.2	41.6	2.9	10440	165	18
HEMSL 100-12	97.5	88.7	69.5	62.5	3.2	11628	130	21
HEMSL 125-15	130.0	116.7	85.4	70.5	4.0	14508	185	25
HEMSL 150-18	153.2	135.7	99.8	79.9	4.8	17424	204	30
HEMSL 175-21	183.6	160.8	114.0	82.6	5.6	20304	235	32
HEMSL 200-24	206.1	178.3	133.2	108.3	6.5	23220	265	35

1.3 General Requirements

1.3.1. Related Documents

All HEM heaters comply with the following European Directives:

Energy Related Product Directive:	**2009/125/EC***
Gas Appliance Directive:	**2009/142/EC**
Electromagnetic Compatibility Directive:	**2004/108/EC**
Low Voltage Directive:	**2006/95/EC**
Machinery Directive:	**2006/42/EC**

Air heater(s) must be installed in accordance with **BS6230** and **BS5440** plus any relevant requirements of local and national building codes. * *where appropriate*.

1.3.2 Electrical Supply

Wiring external to the air heater must be installed in accordance with the I.E.E. Regulations for Electrical Installations and any local regulations which apply.
All standard heaters are supplied by 230V - 1ph, 50Hz.
The method of connection to the main electricity supply must:-

- facilitate the complete electrical isolation of the unit(s) via a suitable fused isolator (see section 2.4.5 for ratings)
- be in a readily accessible position adjacent to the unit(s)
- serve only the unit(s)
- have a contact separation of at least 3mm in all poles.

See the accompanying wiring diagram for the heater electrical connections.

1.3.3 Gas Supply

A servicing valve and union to facilitate servicing must be fitted to the gas inlet pipe work of the heater. The gas supply must be completed in solid pipe work and be adequately supported.

WARNING: When completing the final gas connection to the heater do not place undue strain on the gas pipe work of the heater.

1.3.3.1 Service Pipes

The local gas undertaking should be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas to suit the building requirements. An existing service pipe must not be used without prior consultation with the local gas undertaking.

1.3.3.2 Meters

An existing meter should be checked, preferably by the gas undertaking, to ensure that the meter is adequate to deal with the total rate of gas supply required by all connected equipment.

1.3.3.3. Installation Pipes

Installation pipes should be fitted in accordance with IGE/UP/2. Pipe work from the meter to the air heater must be of adequate size.

Do not use pipes of a smaller size than the inlet gas connection of the heater.

The complete installation must be tested for soundness as described in the above Code.

1.3.4 Ventilation Requirements for AHU's

Refer to tables detailed on next page for calculated free areas of ventilation grilles.
Refer to Index 1 for Air inlet/exhaust flue and ventilation sketches

1.3.4.1 Type B flued installations.

Where AHU's are installed within the heated space (ie not in a plant room) and having a building design air change rate of greater than 0.5/h, additional provision for ventilation is **not required.**

If the building design air change rate is **less than** 0.5/h, additional provision for natural or mechanical ventilation **is required.**

These being:
Natural Ventilation: Grilles having a free area of at least 2cm² per kW of rated heat input shall be provided at low level i.e. below the level of the heater flue connection.

or

Mechanical Ventilation: Must ensure that the space air change rate is at least 0.5/h, must be of the 'input' type and interlocked to ensure the heaters cannot work if the input system is not working.

1.3.4.1 Type B flued installations.

Where AHU's are installed in a plant room (ie not within the heated space) having combustion air drawn directly from the room and connected to a flue that evacuates the products of combustion directly from the room additional provision for natural or mechanical ventilation **is required.**

These being:

Natural Ventilation:
There must be permanent air vents communicating directly with the outside air, at high level and at low level.

For Plant Rooms
Low level (inlet) 4cm²/kw of total rated net heat input
High level (outlet) 2cm²/kw of total rated net heat input

Mechanical Ventilation: The minimum flow rate of ventilation shall be 4.14m³/h per kilowatt of total rated heat input.

1.3.4.3 Type C flued installations.

Note Not applicable for models 175 and 200

Where AHU's are Installed within the heated space (ie not in a plant room) having combustion air ducted to the appliance and combustion products ducted to the outside air, **NO additional provision** for the supply of either combustion air or for combustion products dilution or additional provision for the supply of air is necessary.

1.3.4.3 Type C flued installations.

Where AHU's are installed in a plant room (ie not within the heated space) having g combustion air ducted to the appliance and combustion products ducted to the outside, air vents **shall be** provided and be permanently **open.**

To room or internal space
Low level (inlet) 10cm²/kw of total rated net heat input
High level (outlet) 10cm²/kw of total rated net heat input

Direct to outside air
Low level (inlet) 5cm²/kw of total rated net heat input
High level (outlet) 5cm²/kw of total rated net heat input..

1.3.5 Burner/Controls Enclosure.

Where the flue system is a Type C12 or C32 the burner and controls enclosure, whether it is part of the unit the module is fitted in or an enclosure in its own right, must meet the requirement of BS EN1020 Clause 6.1.1.24 i.e. the air leakage rate from the enclosure shall not exceed 0.5m³/h per kW of heat input, with a maximum of 25 m³/h.

With the flue connected the terminal is sealed, any access door is closed and the gas inlet is isolated. Air is passed into the appliance via a flow meter and the air flow rate is noted when the pressure inside the enclosure is steady at 0,5mbar above the atmospheric pressure.

NOTE A convenient method of testing the appliance is to enclose the terminal in a plastic bag into which an air entry pipe and tube connected to a pressure gauge can be fitted.

1.3 General Requirements

1.3.6. Ventilation Requirements

		Type B22 Installation *(these refer to section 2.2 of these instructions)* Air vents shall be permanently open. In all cases figures are per heater installed. For multi heater installations the appropriate values for each heater must be added together			**Type C12 or C32 Installation** *(these refer to section 2.2 of these instructions)* Air vents shall be permanently open. Figures are for heaters in plant rooms or enclosures ONLY In all cases figures are per heater installed. For multi heater installations the appropriate values for each heater must be added together.			
HEM-NVx	Heat Input kW	In the heated space	In a plant room, ventilation to outside		Ventilation is to a room or internal space		Ventilation is to a outside air	
		Low level grille. Free area cm²	Low level grille. Free area cm²	High level grille. Free area cm²	Low level grille. Free area cm²	High level grille. Free area cm²	Low level grille. Free area cm²	High level grille. Free area cm²
HEMNVx 10-3	10.3	20.6	41.2	20.6	103.0	103.0	51.5	51.5
HEMNVx 15-4	16.3	32.6	65.2	32.6	163.0	163.0	81.5	81.5
HEMNVx 18-5	19.8	39.6	79.2	39.6	198.0	198.0	99.0	99.0
HEMNVx 25-5	26.2	52.4	104.8	52.4	262.0	262.0	131.0	131.0
HEMNVx 30-6	30.5	61.0	122.0	61.0	305.0	305.0	152.5	152.5
HEMNVx 40-8	39.6	79.2	158.4	79.2	396.0	396.0	198.0	198.0
HEMNVx 50-6	49.7	99.4	198.8	99.4	497.0	497.0	248.5	248.5
HEMNVx 60-7	61.6	123.2	246.4	123.2	616.0	616.0	308.0	308.0
HEMNVx 75-9	76.6	153.2	306.4	153.2	766.0	766.0	383.0	383.0
HEMNVx 100-12	103.3	206.6	413.2	206.6	1033.0	1033.0	156.5	156.5
HEMNVx 110-13	109.9	219.8	439.6	219.8	1099.0	1099.0	549.5	549.5
HEMNVx 125-15	126.4	252.8	505.6	252.8	2528.0	2528.0	1264.0	1264.0
HEMNVx 150-18	153.9	307.8	615.6	307.8	n/a			
HEMNVx 175-21	174.0	348.0	696.0	348.0				

		Type B22 Installation *(these refer to section 2.2 of these instructions)* Air vents shall be permanently open. In all cases figures are per heater installed. For multi heater installations the appropriate values for each heater must be added together			**Type C12 or C32 Installation** *(these refer to section 2.2 of these instructions)* Air vents shall be permanently open. Figures are for heaters in plant rooms or enclosures ONLY In all cases figures are per heater installed. For multi heater installations the appropriate values for each heater must be added together.			
HEM-SL	Heat Input kW	In the heated space	In a plant room, ventilation to outside		Ventilation is to a room or internal space		Ventilation is to a outside air	
		Low level grille. Free area cm²	Low level grille. Free area cm²	High level grille. Free area cm²	Low level grille. Free area cm²	High level grille. Free area cm²	Low level grille. Free area cm²	High level grille. Free area cm²
HEMSL 30-6	31.7	63.4	126.8	63.4	317.0	317.0	158.5	158.5
HEMSL 45-9	45.0	90.0	180.0	90.0	450.0	450.0	225.0	225.0
HEMSL 50-6	50.0	100.0	200.0	100.0	500.0	500.0	250.0	250.0
HEMSL 60-12	61.6	123.2	246.4	123.2	616.0	616.0	308.0	308.0
HEMSL 75-9	77.0	154.0	308.0	154.0	770.0	770.0	385.0	385.0
HEMSL 75-15	78.0	156.0	312.0	156.0	780.0	780.0	390.0	390.0
HEMSL 90-18	90.6	181.2	362.4	181.2	906.0	906.0	453.0	453.0
HEMSL 100-12	97.5	195.0	390.0	195.0	975.0	975.0	487.5	487.5
HEMSL 125-15	130.0	260.0	520.0	260.0	1300.0	1300.0	650.0	650.0
HEMSL 150-18	153.2	306.4	612.8	306.4	n/a			
HEMSL 175-21	183.6	367.2	734.4	367.2				
HEMSL 200-24	206.1	412.2	824.4	412.2				

Before installation, check that the:
- local distribution conditions, nature of gas and pressure, and the current state adjustment of the appliance are compatible,
- local electrical supply conditions are compatible with the electrical data given on the data plate.

2.1.1. Unpacking

The module has been fired and tested at the factory prior to despatch. Check the despatch documents and the data plate affixed to the module to confirm that it is as ordered and compatible with the gas and electrical supplies on site.
Read the entire document before commencing installation.

2.1.2 Module Types

Modules are available for:

a) Use within an additional casing e.g. an air handling unit. i.e no factory fitted burner /controls housing.
b) Internal use with a burner /controls housing.
c) For external use with a weatherproof burner/controls housing.
Type a) and type b) can be for either B22 (combustion air taken from the internal space) or C12/C32 (combustion air taken from outside) flue configurations.

2.1.3 Module Fitment

Modules must be handled safely and lifted using the fitted lifting brackets. These can be removed on installation if necessary. The module should slide into the air handling unit/duct section between top and bottom guide rails sized to suit the module in question. It must be possible to easily remove the module at a later date should this be necessary.

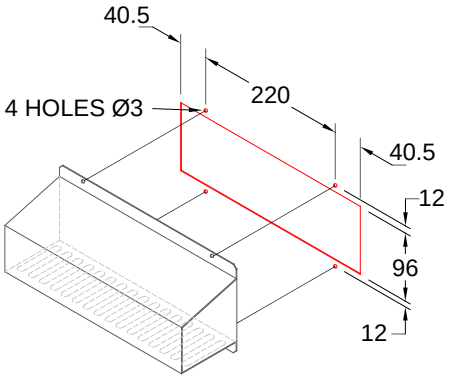
There must be effective sealing between the module burner/controls section so that there is no air leakage from the main air flow path into the burner/controls section.
Modules may be orientated so that the burner manifold(s) is vertical or horizontal.

For external units please note:
The lowest edge of air inlets must be at least 500 mm above ground level. Access panels and doors to be removed during normal servicing shall be designed so that repeated removal and replacement does not damage the insulation or impair the waterproofing of the unit.
No opening (e.g. electrical wiring points) from the inside of the appliance to the outside air shall permit the entry of a 16 mm diameter ball.

2.1.4 Combustion Air Inlet and Flue Products Outlet

Combustion air inlet(s) and flue outlets must be connected to each HEM unit so when the unit is installed, their termination is at least 500mm from ground level.

2.1.4.1 Type B Flued Installations



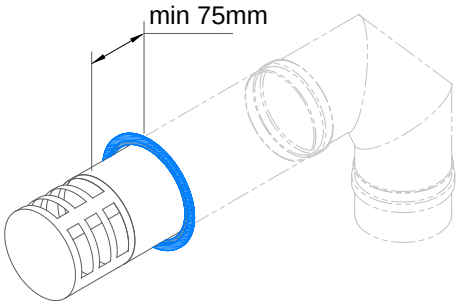
The combustion air inlet attachment requires an aperture to be cut and four pilot holes to be drilled in the front plate of the controls compartment to the following dimensions and must be installed on a level plane.

The combustion air inlet attachment can then be offered up to the front plate and secured using self tapping screws ensuring a positive seal to prevent any ingress of water.

Alternatively an air inlet orifice having a free area of at least 110 cm² (app 105 x 105mm) can be cut into the burner enclosure panel to facilitate the combustion air.

Two air inlet attachments (or free area of 220cm²) are required on models SL75-15; SL90-18; NVx & SL125; NVx & SL150; NVx & SL175.
Three air inlet attachments (or free area of 330cm²) are required on models HEM SL200

A flue outlet terminal is required with every module and is connected to the exhaust fan. Flue outlet terminals can be either standard 450mm long terminals or Powrmatic approved flue system. Flue terminals may be extended by the use of a Powrmatic approved flue piece with sealing ring or cut down to suit the particular application ensuring the flue terminal projects from the front plate by at least 75mm



2.1 Fitting the Unit

For horizontal type B flued installations a Combustion Air Inlet and Flue Termination piece is supplied for each module (two Combustion Air Inlets are supplied with models HEMNVx 150 & 175). For Vertical type B flued installations a Combustion Air Inlet and Flue Termination piece is supplied for each module (two Combustion Air Inlets are supplied with models HEMNVx 150 & 175).

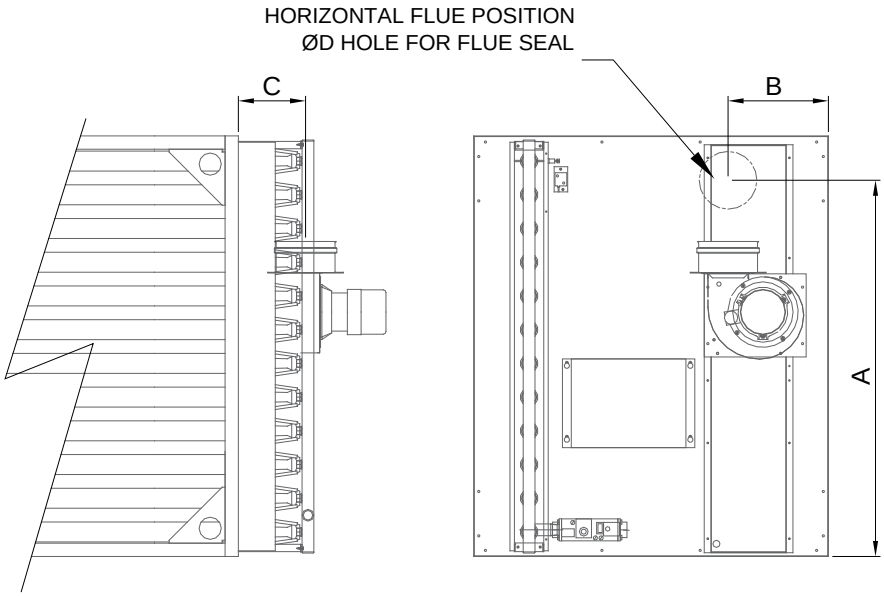
The total **calculated maximum** permitted length of flue system for sizes up to and including model 50 is 14m, from model 60 to 125 is 16m. *If an offset is required a set of 45° bends should be used being equivalent to 0.5m of flue length. 90° bends may be used but each set will be equivalent to 1.0m of flue length.*

For HEM150/175/200 units: use Ø130 flue system for a total calculated length of up to 3M, Ø150 for a total calculated length in excess of 3M up to 9M, Ø180 for a total calculated length in excess of 10m up to 18M and Ø200 for in excess of 18m up to 24M.

Horizontal Flue Outlets, Type B Installation

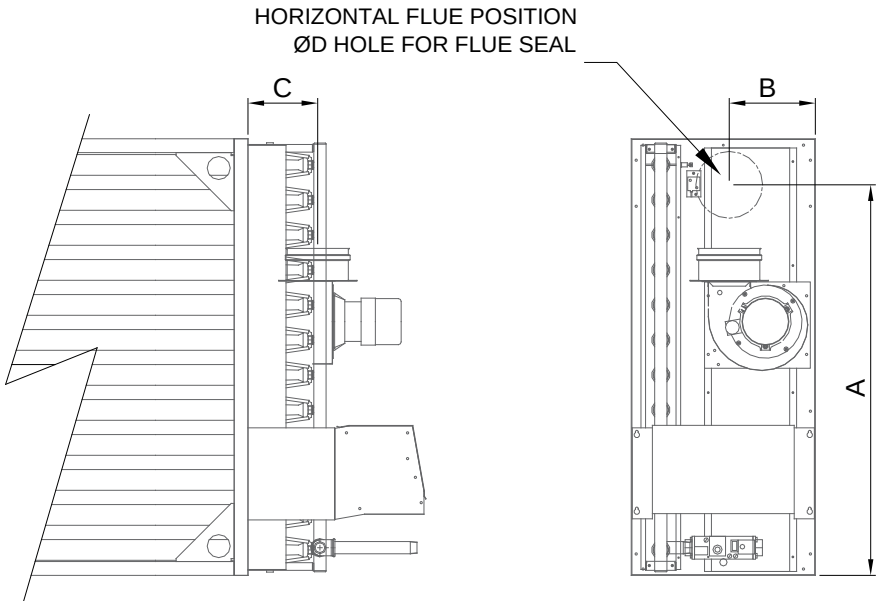
Exhaust flue outlet positions are shown in the following diagrams and tables.

HEM-NVx



Size	A	B	C	ØD
10-3	399	167	108	91
15-4	399	167	108	91
18-5	399	167	108	91
25-5	443	187	121.5	112
30-6	443	187	121.5	112
40-8	637	187	121.5	112
50-6	443	217	121.5	112
60-7	501	227	145.5	142
75-9	641	227	145.5	142
100-12	848	226	151.5	142
110-13	997	204	181	142
125-15	1137	204	181	142
150-18	1347	204	181	142
175-21	1554	204	181	142

HEM-SL



Size	A	B	C	ØD
30-6	453.5	179	121.5	112
45-9	659	179	121.5	112
50-6	453.5	179	121.5	112
60-12	815	188	145.5	142
75-9	651	188	145.5	142
75-15	1172	188	145.5	142
90-18	1333	187	151.5	142
100-12	848	187	151.5	142
125-15	1135	35	180.5	142
150-18	1345	35	180.5	142
175-21	1552	35	180.5	142
200-24	1769	116	181	142

2.1.4.2 Type C Flued Installations

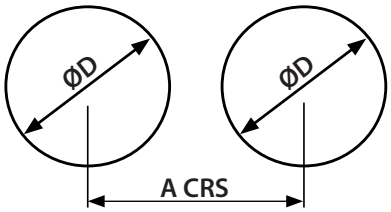
IMPORTANT:
Not applicable for models 150, 175 & 200

For Type C flued installations, a concentric flue system should be used of the appropriate orientation.

The total **calculated maximum** permitted length of flue system for sizes up to and including model 50 is 14m, from model 60 to 125 is 16m. *Concentric flue terminals are equivalent to 5m of flue length. If an offset is required two sets of 45° bends should be used each set being equivalent to 0.5m of flue length. 90° bends may be used but each set will be equivalent to 1.0m of flue length.*

Exhaust flue outlet positions are shown in the previous diagrams and tables.

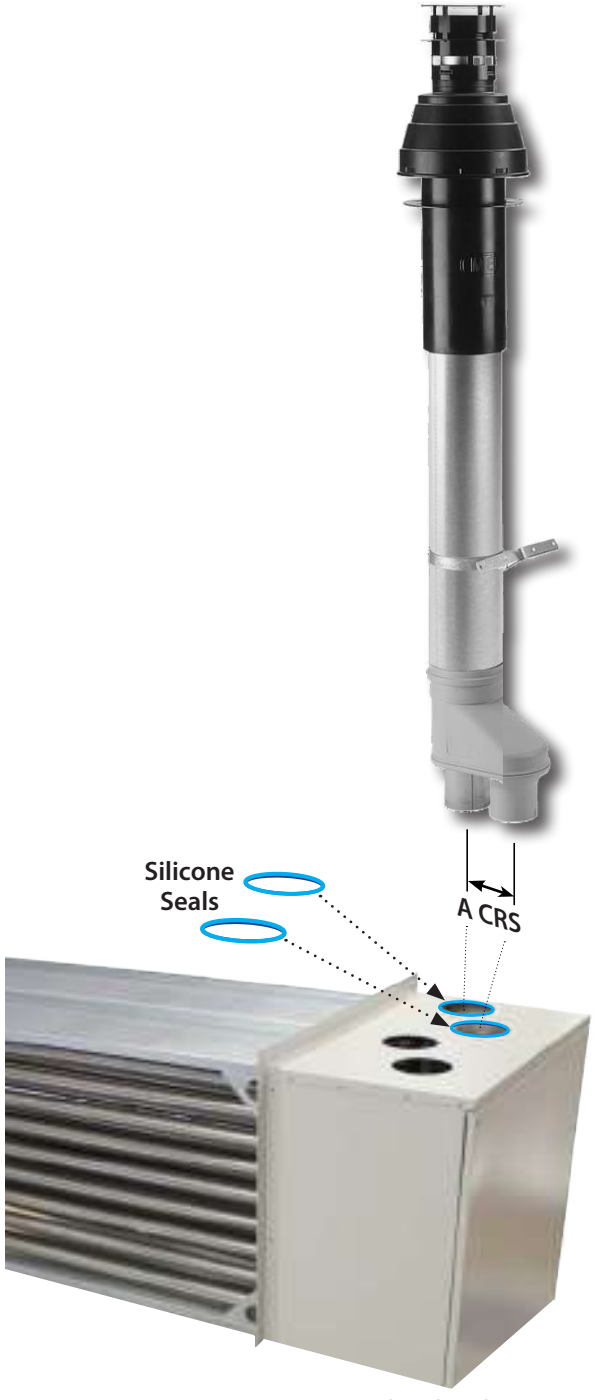
Air inlet holes should be cut to the dimensions in the following table to accept the silicone seals supplied. *(where ØD is the actual cut size in the casing/sheet metal).*



Type C Flue and air inlet cut hole sizes and centres distances. (refer to table below)

HEMNVx	HEMSL	A CRS	ØD
10-3	n/a	120	91
15-4	n/a	120	91
18-5	n/a	120	91
25-5	n/a	142	112
30-6	**30-6**	142	112
40-8	n/a	142	112
n/a	**45-9**	142	112
50-6	**50-6**	142	112
60-7	n/a	220	142
n/a	**60-12**	220	142
75-9	**75-9**	220	142
n/a	**75-15**	220	142
n/a	**90-18**	220	142
100-12	**100-12**	220	142
110-13	n/a	220	142
125-15	**125-15**	220	142

The silicone seals supplied are not water tight and should not be used in external vertical applications. A suitable water tight seal or sealant must be used in these instances



Simulated enclosure

2.1.5 Gas Installation

The whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of IM/16:1988.

2.1 Fitting the Unit

2.1.6 Electrical Connections

Only a suitably qualified operative can complete the electrical installation and must observe the rules in force.

All electrical connections are made to the screw terminals in the control section and should be in accordance with the terminal markings and the wiring diagram for the module.

Module(s) must be earthed.

A lockout indicator light and reset button are fitted in the control panel. If required these functions can be duplicated remotely from the module.

2.1.7 Main Air Fan

The module(s) does not include the main air moving fan. Direction of airflow may be either R-L or L-R for vertically orientated modules or from top to bottom or bottom to top for horizontally orientated units.

2.1.7.1 Main Fan Interlock Proving Switch

The main fan must be interlocked to the module by a pressure switch or sail switch or equivalent so that if the main air flow fails for any reason the module(s) is shut down.

2.1.7.2 Minimum Airflow Requirement

The minimum airflows specified in section 1.2 must not be reduced.

2.1.7.3 Maximum Airflows

The airflow across the module(s) should be kept at a level that ensures condensation in the tubes will not occur with the remainder of the air flow passing through a bypass section to be mixed with the heated air downstream of the module(s).

Please contact the Powrmatic office to obtain the appropriate bypass dimensions to suit the specific heater.

2.1.7.4 Main Fan Over-run

The main fan controls must ensure that when the module is tuned off, i.e. the heat demand is satisfied, the main fan continues to run for 3-4 minutes to dissipate the residual heat from the module.

2.1.8 Flue System

Only flue systems supplied through Powrmatic Ltd may be used with HEM modules. The flue outlet socket must be connected via the provided flue system to outside air.

The maximum permitted length of flue system is shown in duties on page 6 and 7. If an offset is required, two sets of 45° bends should be used each set being equivalent to 0.5m of flue length. 90° bends may be used but each set will be equivalent to 1.0m of flue length.

All outer joints must be finished with the provided locking bands. A smear of silicon grease to the inside of sockets will assist in fitting components together.

All flue and combustion air ducts must be supported independently of the air heater.

The flue or flue/combustion air terminal must not be installed so as to be less than:
300mm below an opening e.g. window, air brick etc.
200mm below eaves or gutter.
300mm from an internal or external corner.
1200mm from a surface facing the terminal.
1500mm vertically from another terminal on the same wall.
300mm horizontally from another terminal on the same wall.

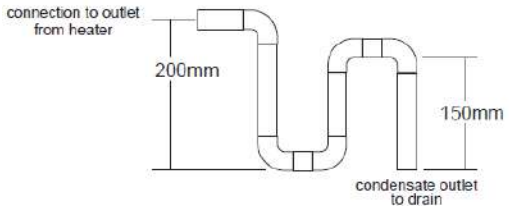
The flue must terminate in a freely exposed position and be sited to prevent the products of combustion entering any opening in a building in such concentration as to be prejudicial to health or a nuisance.

Twin Wall Flue can also be used

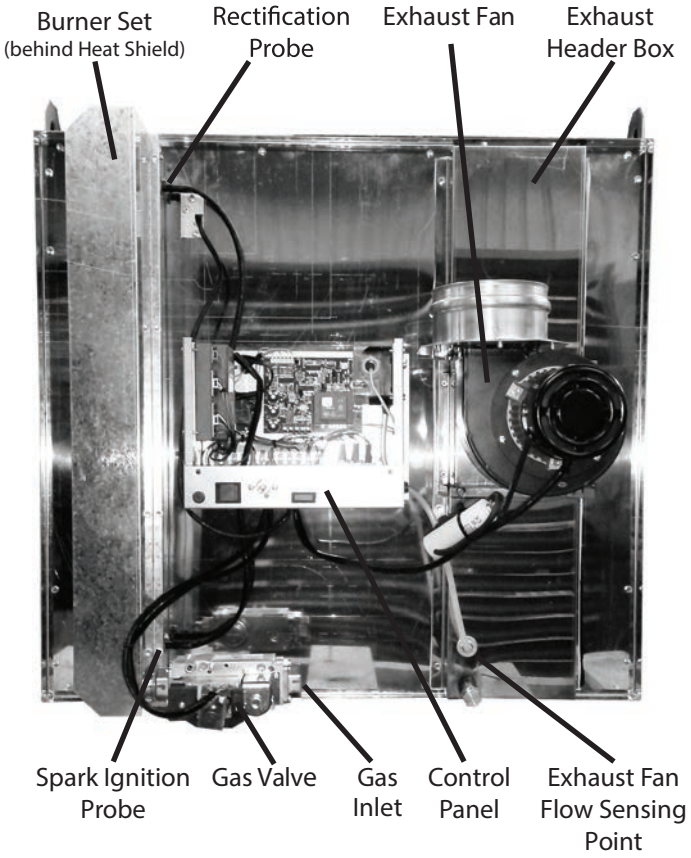
2.1.9 Condensate Drainage

If, given the application and usage of the module, it is considered that condensate will be formed at times then the condensate drain pipe at the base of the unit must be fitted with an external trap, equivalent to that shown below, the outlet of which must be run to a local drain point. The trap can be a proprietary item or fabricated using standard domestic 32mm waste water fittings in which case ensure that the dimensions shown are adhered to.

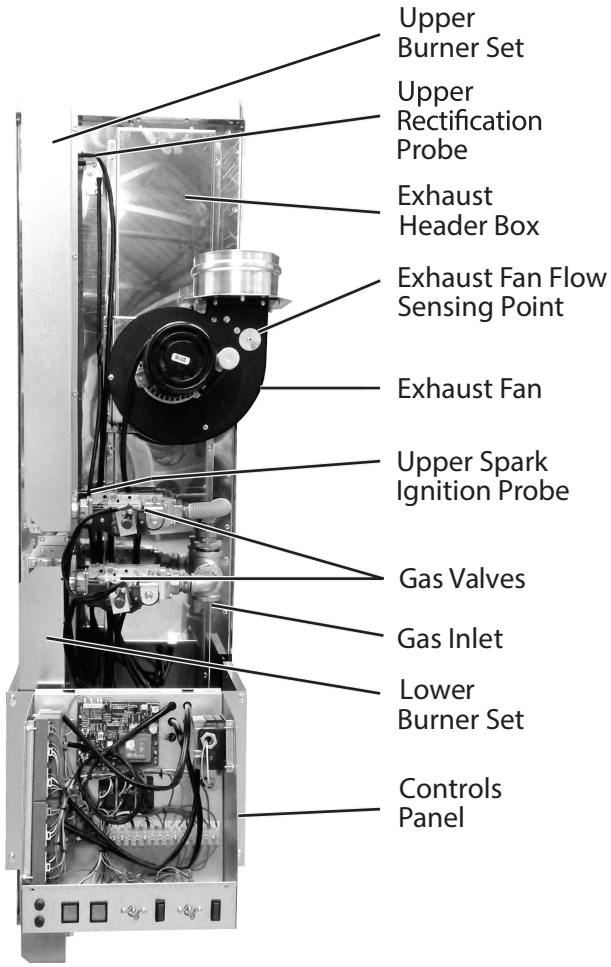
The trap must be filled with water after installation and before the heater is commissioned. The trap and associated pipe work must be protected from freezing. If drainage under gravity is not possible a condensate pump should be used and installed following the manufacturers instructions.



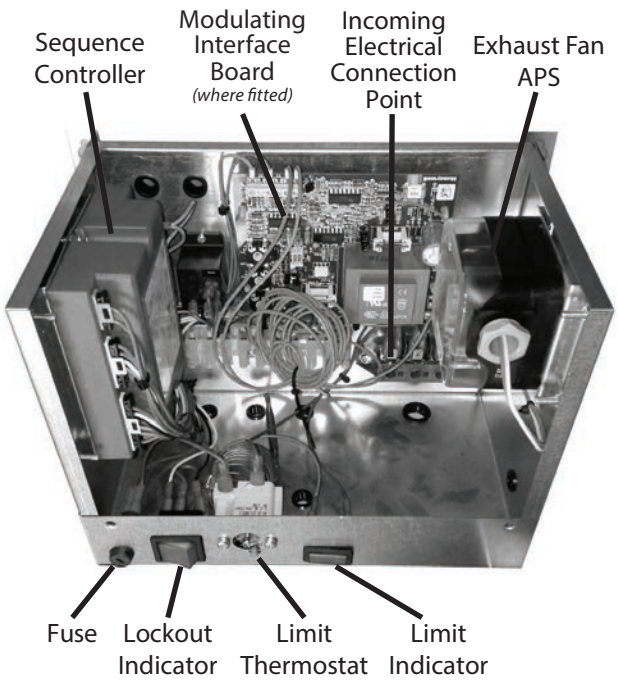
2.2 General Identification of Items



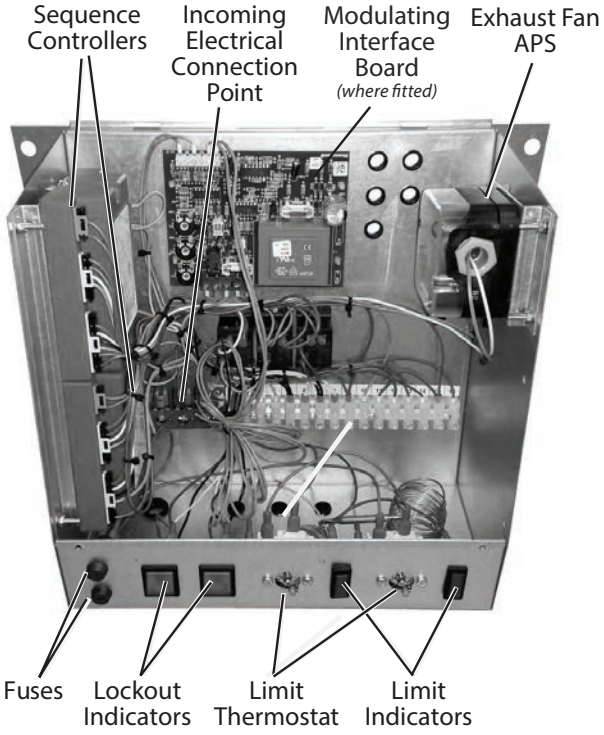
Single Burner Internal Components



Dual Burner Internal Components



Single Burner Controls Compartment



Dual Burner Controls Compartment

2.3 Electrical Connections

Warning: THIS APPLIANCE MUST BE EARTHED.

Warning: Lockout reset is by a switched Neutral to the controls in the heater.

Warning: Wiring external to the unit must be carried out by an appropriately qualified person to current IEE regulations for Electrical Installations and any local regulations which apply. Wiring should be completed in flexible conduit.

The local electrical supply must be run to a point adjacent to the heater and be suitably terminated to provide an isolation point that will prevent remote activation of the unit during servicing.

The local electrical supply conditions must be compatible with the electrical data given on the appliance data plate. Wiring should be completed in flexible conduit.

Heaters are for use with 230V, 1N, 50Hz supplies.

The method of connection to the main electricity supply must:-

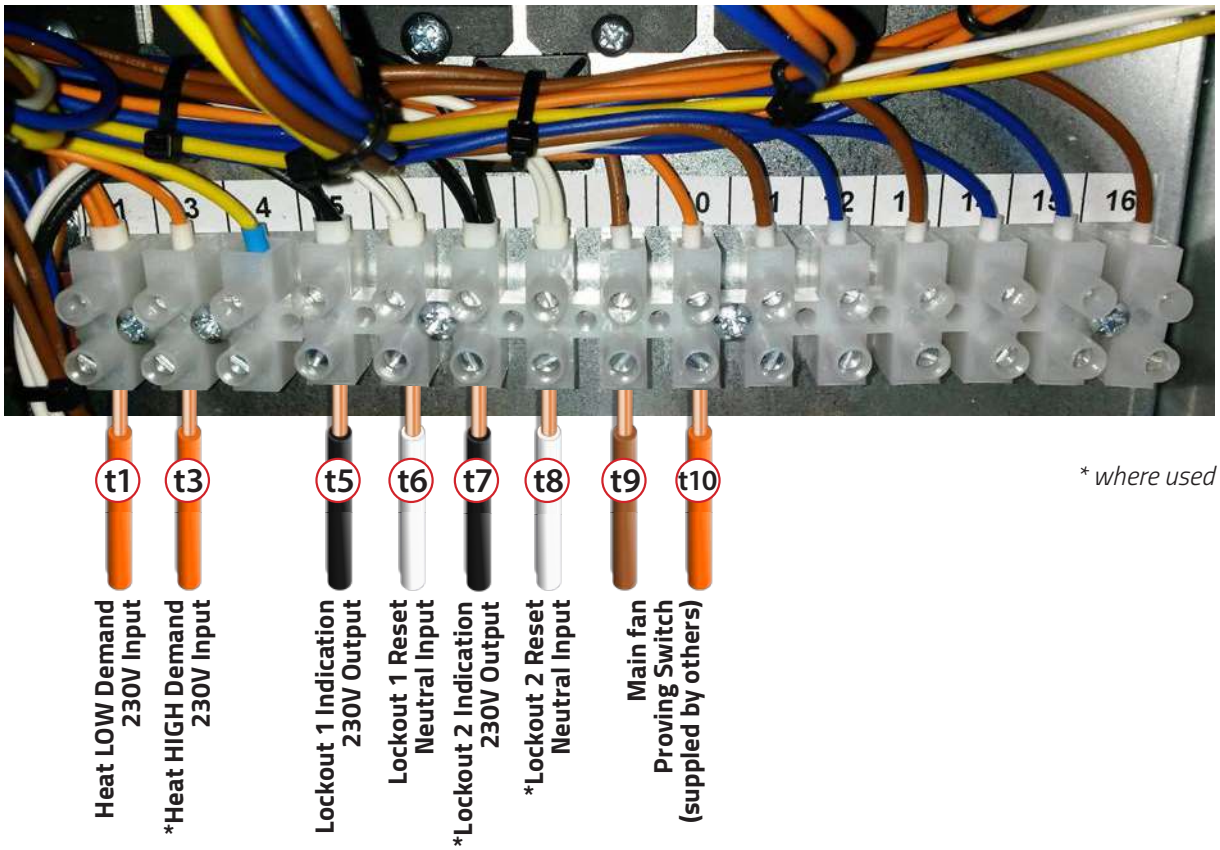
- facilitate the complete electrical isolation of the heater(s) via a suitable fused isolator that will prevent remote activation of the heater during servicing (see section 1.2 for ratings).
- be in a readily accessible position adjacent to the heater(s).
- serve only the heater(s).
- have a contact separation of at least 3mm in all poles.

See section 2.5 or the accompanying wiring diagram for the heater electrical connections.

Reference must be made to Section 2.4.5 to ascertain the electrical loading of the unit(s) being installed so that cables of adequate cross-sectional area are used for the electrical installation. The length of the conductors between the cord anchorage and the terminals must be such that the current carrying conductors become taut before the earth conductor if the cable or cord slips out of the cord anchorage. All external controls must be of an approved type.

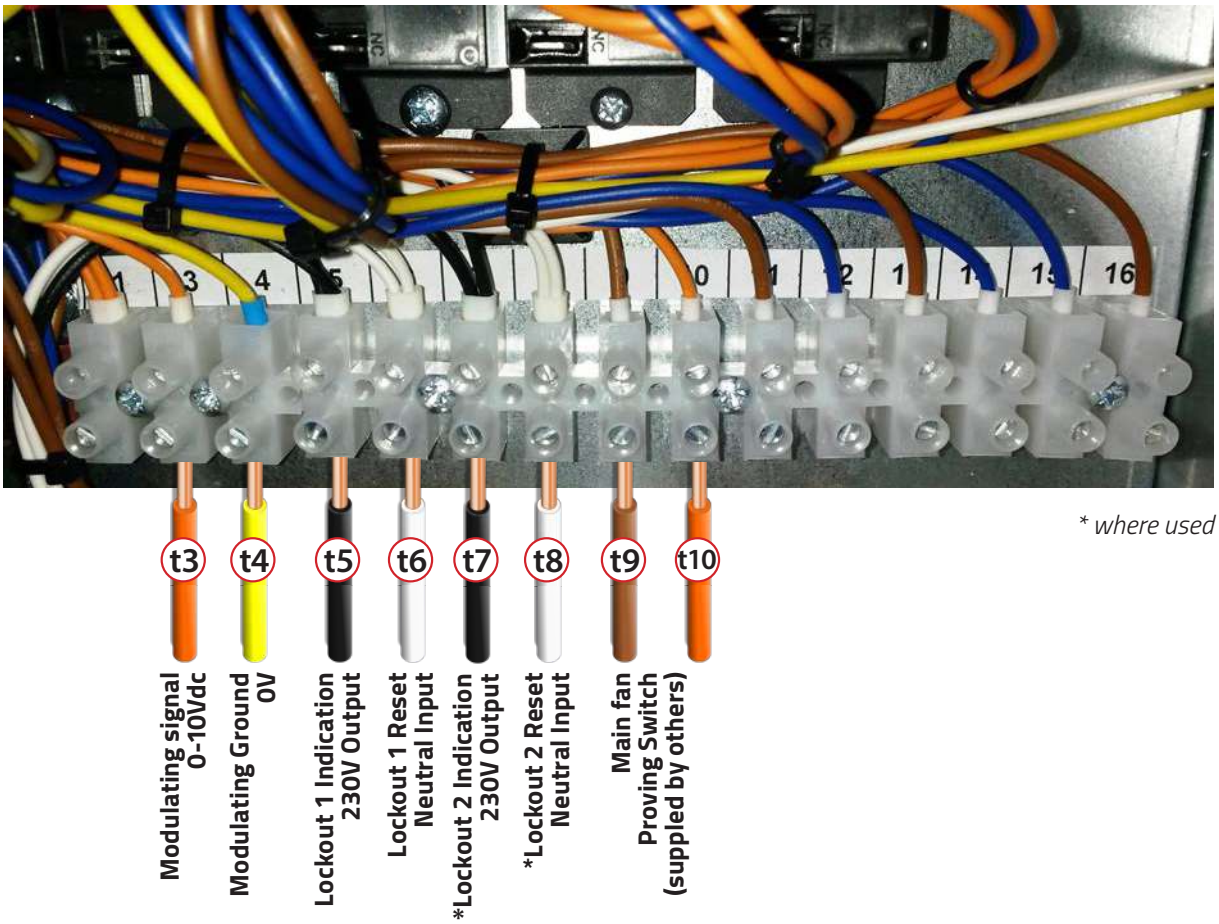
2.4 Electrical Cable Installation

2.4.1 Single and Dual High-Low Burners



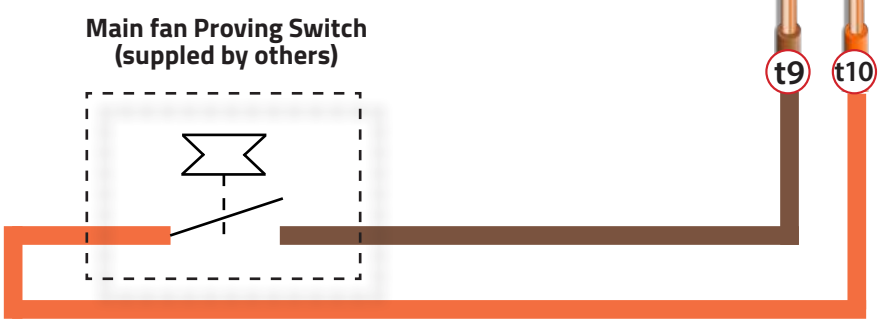
** where used*

2.4.2 Single and Dual Modulating Burners



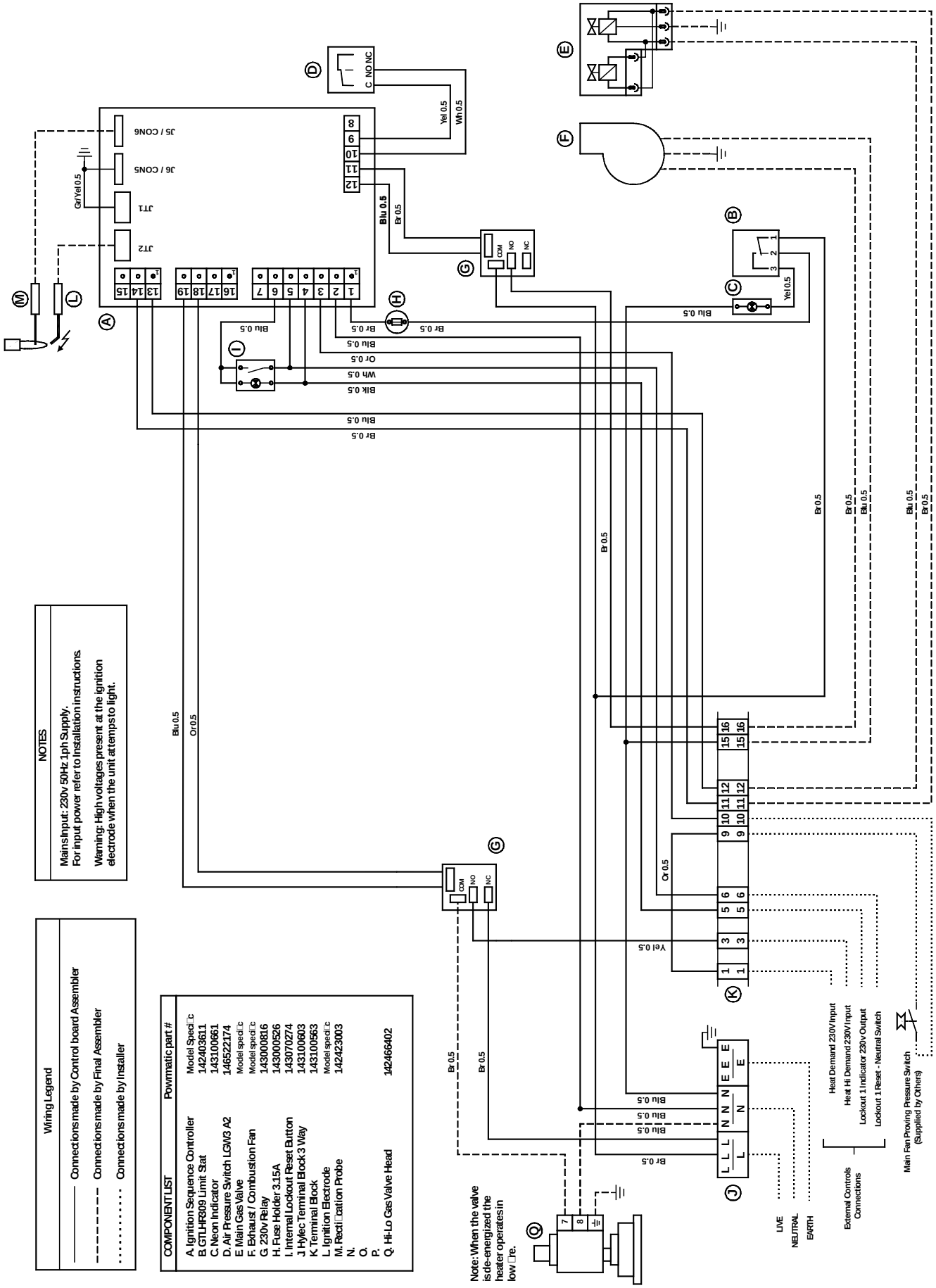
** where used*

2.4.3 Proving Switch Enable Circuit

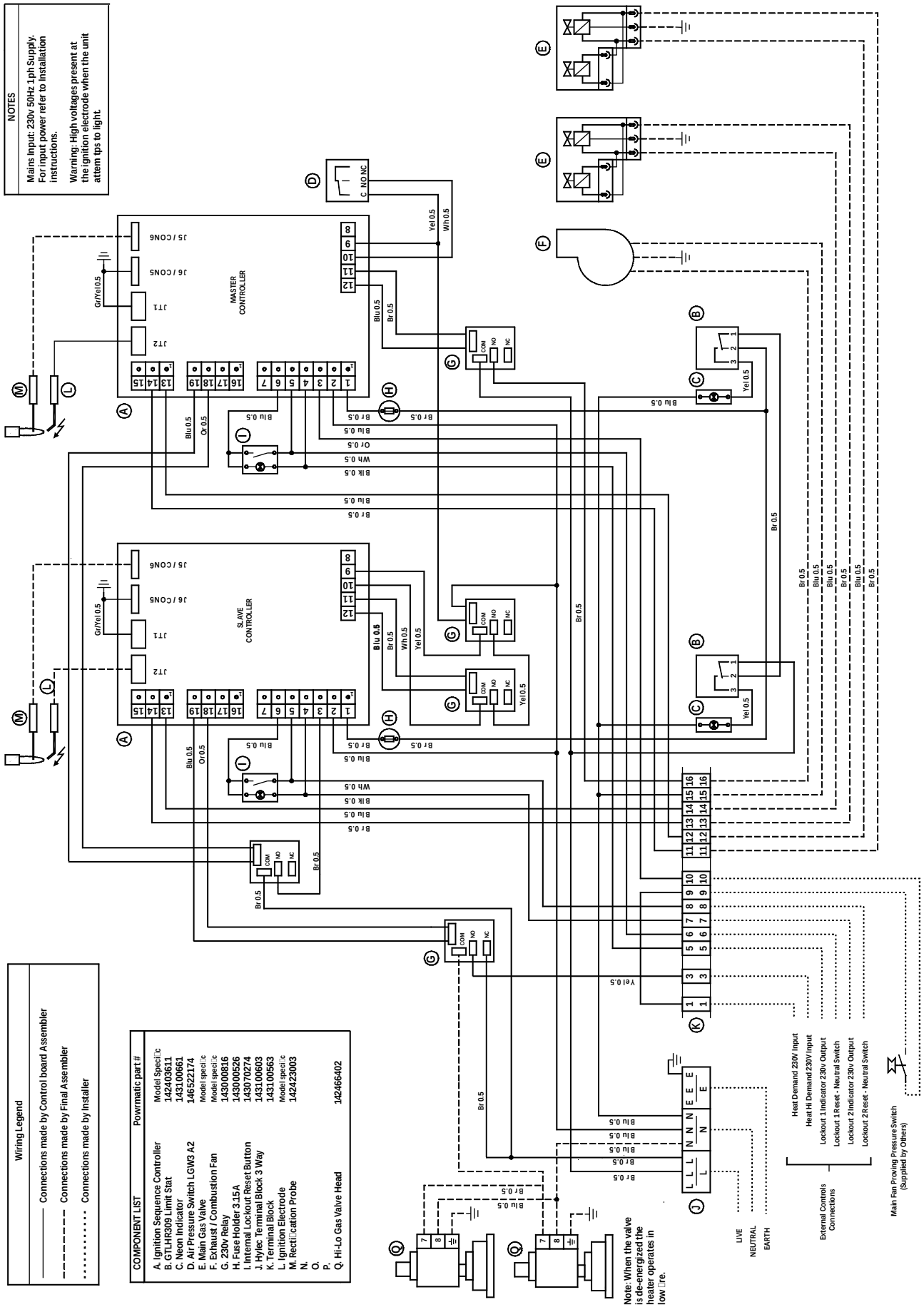


2.5 Wiring Diagrams

2.5.3 HEM Single Burner Unit (with HIGH/LOW Burner)

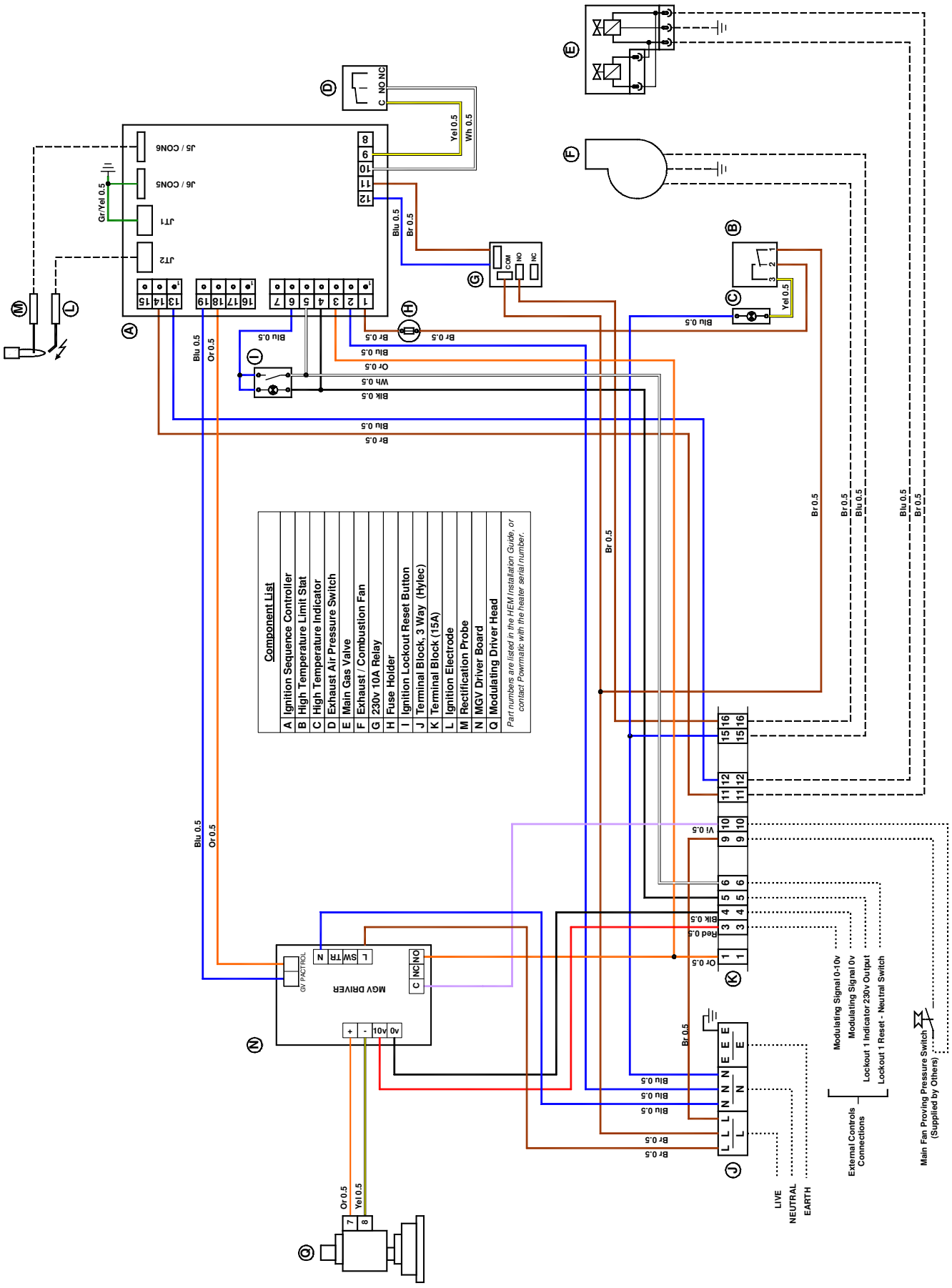


2.5.4 HEM Dual Burner Unit (with HIGH/LOW Burner)

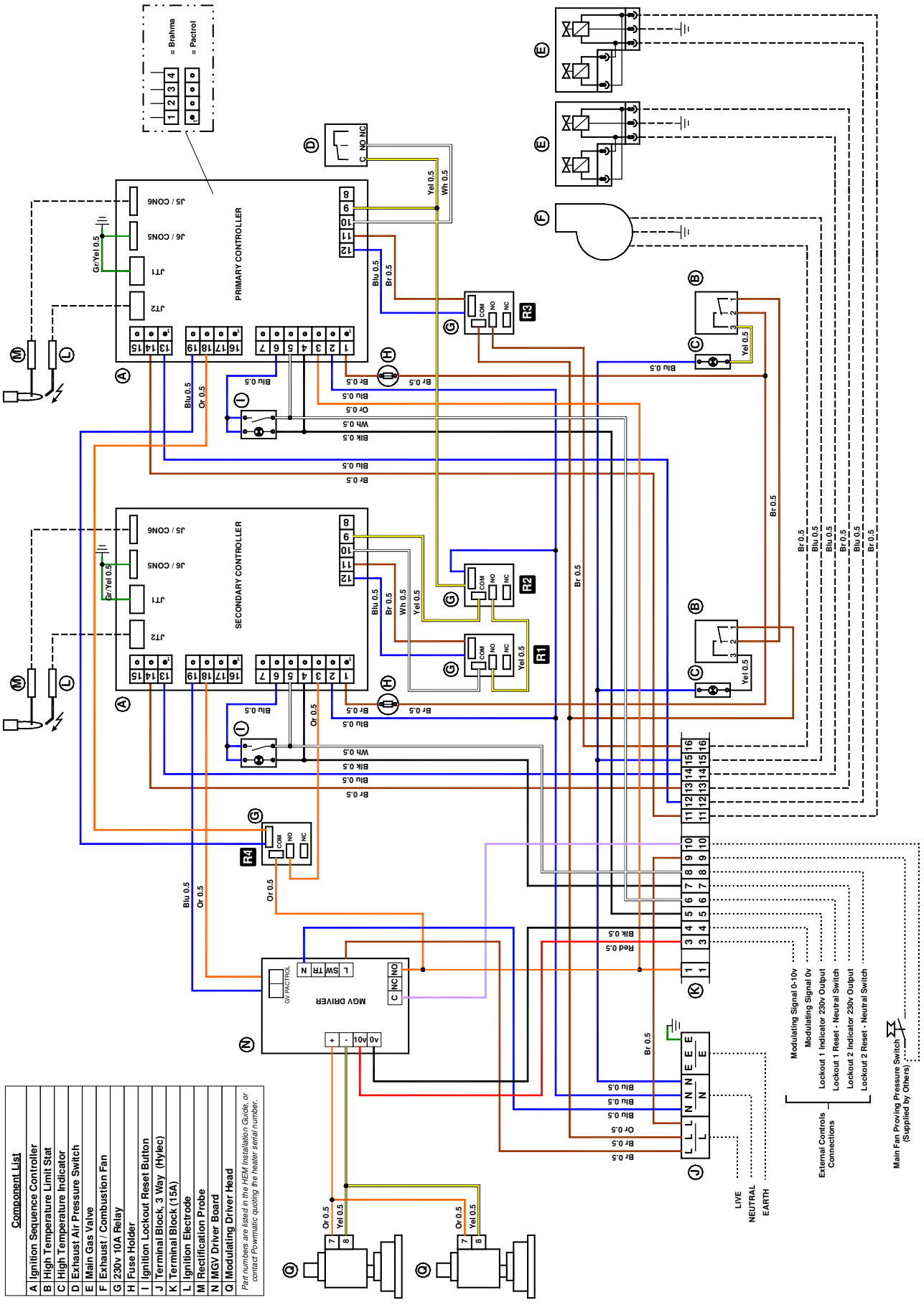


2.5 Wiring Diagrams

2.5.5 HEM Single Burner Unit (with MODULATION Burner)



2.5.6 HEM Dual Burner Unit (with MODULATION Burner)



2.6 Commissioning and Testing

Gas Safety (Installation & Use) (Amendment) Regulations

It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

2.6.1. Electrical Installation

Checks to ensure electrical safety must be carried out by a qualified person and must include.

i) Ensure that a two pole electrical isolator having a minimum separation between pole of 3.0mm is fitted adjacent to the module.

ii) That the correct value fuse and cable size has been used.

iii) That the module is correctly earthed.

iv) That polarity at the module is correct.

v) That connections to the module are as per the wiring diagram.

vi) That the main air fan is interlocked with the module so that the module will not function if there is no air flow.

vii) That installation wiring has not been routed adjacent to components that will become hot when the module is working. e.g. burners, exhaust header box.

2.6.2. Gas Installation

For new installations, the whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of IGE/UP/1 (Edition 2) or IGE/UP/2A as appropriate.

2.6.3. Checks before Operating the Air Heater

The following preliminary checks should be made before lighting the heater(s)

a) Ensure that the ELECTRICAL supply to the heater is switched OFF.

b) Check that all warm air delivery outlets are open.

c) Check that all external controls are calling for heat.

d) Ensure the external control/BMS is set to winter operation.

1. Ensure that the gas service valve is closed.

2. Switch on the electrical supply at the isolator and the ignition sequence will commence. After a delay of approximately 45 seconds the ignition spark will be generated and the main gas valve(s) energised.

3. If the limit indicator light comes on press the limit thermostat reset switch on the front panel. The Red indicator light will go out and the ignition sequence will commence. After a delay of approximately 45 seconds the ignition spark will be generated and the main gas valves energised.

4. The burners will fail to light as the gas service valve is closed.

The control box will attempt ignition a further four times and then go to lockout and the lockout light/reset switch will be illuminated.

5. To restart the ignition sequence depress the lockout light/reset switch for about 3 seconds.

2.6.4. Operating the Air Heater

NOTE: On initial lighting of the heater(s), it may take some time to purge the internal pipe work of air.

IMPORTANT: The internal pipe work of the appliance has been tested for soundness before leaving the factory. After establishing the main burners test round the gas inlet connection using a leak detection fluid.

1. Switch on the electrical supply at the isolator and the ignition sequence will commence. After a delay of approximately 45 seconds the ignition spark will be generated and the main gas valve(s) energised.

2. If the burners fail to light the control box will complete a further four ignition attempts. If at the end of five attempts the burners have still not lit the control box will go to lockout and the amber rocker switch will be illuminated. To restart the ignition sequence depress the illuminated reset button for about 1-2 seconds.

2.6.5 Shut Off

Set the external controls to OFF. If required, once the main air fan has stopped or the module is cold, the electrical supply to the module can be switched OFF.

2.6.6 Adjustments

2.6.6.1. Burner Gas Pressures

This is set for the required heat input before despatch. In the case of High/Low and Modulating units both high and low pressures are set. Pressures should be checked in the following manner:

2.6.6.1.1. High/Low Regulation

1. Set external controls to ensure the main burner is off. Open the side access panel. Connect a pressure gauge to the burner pressure test point on the multifunctional control.

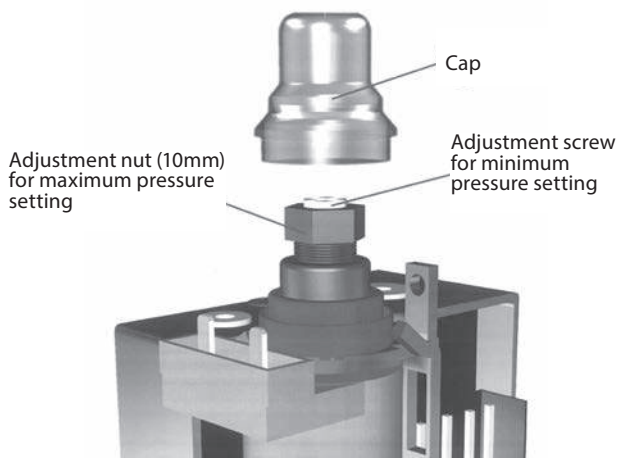
2. Set external controls to turn on the main burner and maintain high fire. Compare the measured burner gas pressure to that stated on the data plate. In addition it is advisable to check the gas rate using the gas meter dial pointer ensuring that no other appliances supplied through the meter are in operation.

3. Repeat 2 above with external controls set to maintain low fire.

4. If it is necessary to adjust either the high fire or low fire pressures proceed as follows after levering off the plastic cover from the High/Low regulator.

Note: High fire setting must be adjusted first after which the low fire setting can be set. Any adjustment of the high fire setting alters the minimum setting.

2.6.6.1.1.1. SIT Sigma 843 Adjustment



Maximum Setting.

With the controls set to high fire, use an adjustable or 10mm spanner to screw the adjustment nut in to increase and out to decrease, until the required pressure is obtained.

Turn the burner On and OFF several times to check the pressure setting and then turn off.

Minimum Setting.

Disconnect electrical connection to the regulator and turn the burner back on and wait until the burner pressure has stabilised.

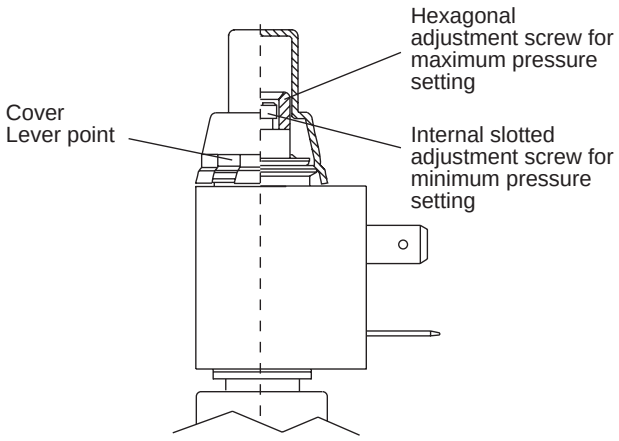
Keeping the nut stationary, use a 6 x 1 screwdriver to turn the slotted adjustment screw clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained.

Reconnect high/low regulator and check high fire pressure.

Repeat both steps if necessary and then replace cover cap

5. Turn off the main burner, disconnect the pressure gauge and replace the sealing screw.

2.6.6.1.1.2. Honeywell V4336 Adjustment



Maximum Setting

With the controls set to high fire, use an adjustable or 8mm spanner to turn the adjustment screw, clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained

Turn the burner On and OFF several times to check the pressure setting and then turn off.

2.6 Commissioning and Testing

Minimum Setting

Disconnect electrical connection to the regulator and turn the burner back on and wait until the burner pressure has stabilised.

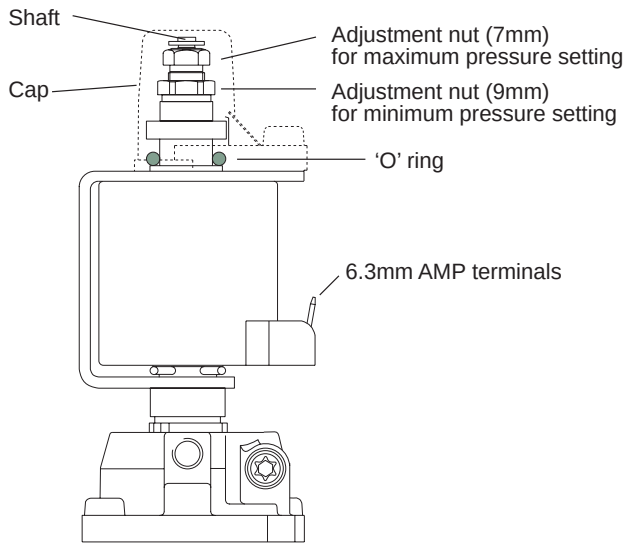
Use a screwdriver to turn the slotted adjustment screw clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained.

Reconnect high/low regulator and check high fire pressure.

Repeat both steps if necessary and then replace cover cap.

5. Turn off the main burner, disconnect the pressure gauge and replace the sealing screw.

2.6.6.1.2. Modulating Regulation



1. Set external controls to ensure that the main burner is off. Open the side access panel. Connect a pressure gauge to the burner pressure test point on the multifunctional control.

2. Set external controls so as to turn on the main burner and maintain high fire. Compare the measured burner gas pressure to that stated on the data plate.

In addition it is advisable to check the gas rate using the gas meter dial pointer ensuring that no other appliances supplied through the meter are in operation.

3. Repeat 2 above with external controls set to maintain low fire.

4. If it is necessary to adjust either the high fire or low fire pressures proceed as follows after removing the plastic cover from the Modulating regulator.

Note: Minimum fire setting must be adjusted first after which the high fire setting can be set. Any adjustment of the minimum fire setting alters the maximum setting.

Minimum Setting.

Disconnect electrical connection of modulating regulator and turn burners back on and wait until the burner pressure has stabilised.

Turn 9mm adjustment nut for low fire pressure clockwise to increase and counter-clockwise to decrease until the required pressure is obtained.

Reconnect modulating regulator and check high fire pressure, readjust if necessary.

Maximum Setting.

Disconnect electrical connection of modulating regulator and turn burners back on and wait until the burner pressure has stabilised.

Push shaft gently downwards to the maximum adjustment screw and hold there. Turn 7mm adjustment nut for high fire pressure, clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained. Release shaft.

Repeat both settings if necessary and then replace cover cap.

5. Turn off the main burner, disconnect the pressure gauge and replace the sealing screw.

2.6.6.1.3. Modulating Burner Control

Standard control for modulating burners, this MGV board is fitted to the module and interfaces between a 0-10VDC control signal and the modulating regulator.

Basic operation method.

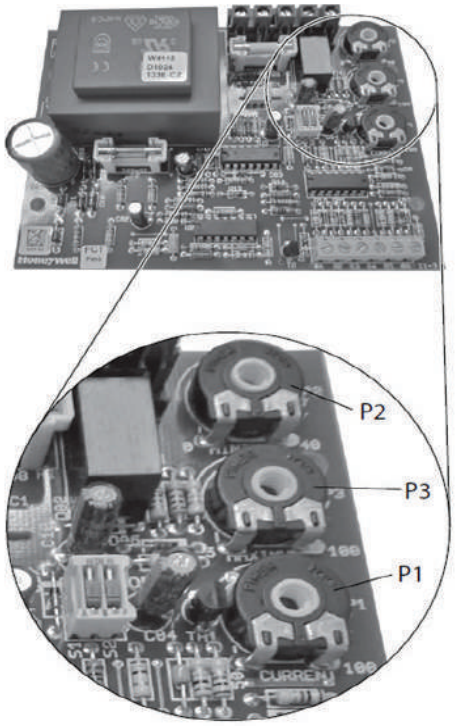
1. With the 0 to 10 signal at 0, the gas valve drive signal will be de-energised.

2. When the input control signal goes to >2V, the gas valve drive output will be at its maximum output value for a preset 2 minutes.

3. After the preset 2 minutes of maximum output, the 0 to 10V input signal will take control of the gas valve drive.

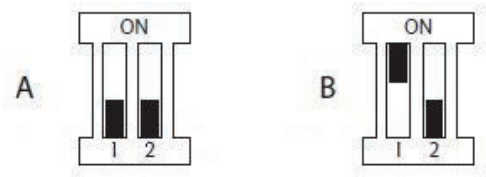
4. When the 0 to 10V signal drops below 1V the signal will drop to zero and the gas valve drive signal will be de-energised.

2.6.6.1.4. Alternative GM44 Modulating Driver



The MIB interfaces between a 0-10VDC control signal and the modulating regulator. The following are applicable to this application.

1. Slide switches 1 & 2 should both be to 'OFF' if one modulating valve is being driven (A), switch 1 'ON' and switch 2 'OFF' if two modulating valves are being driven (B)



2. Potentiometer P1 (Default setting 100%)

The control current of the V7335A is controlled by P1, varying between 50% and 100% of the input signal.

E.g.

-When P1 is set at 100% (fully clockwise) maximum power (165mA @ 22VDC) is provided to the modulation coil with a 10VDC input control signal.

-When P1 is set at 50% (fully anticlockwise) maximum power (165mA @ 22VDC) is provided to the modulation coil with a 5VDC input control signal.

3. Potentiometer P2

Controls the minimum drop-out voltage between 0% and 40%

E.g.

- When P2 is set at 0% the drop-out voltage with an input control signal of 0-10V-DC is 0.3V-DC.

- When P2 is set at 40% the drop-out voltage with an input control signal of 0-10V-DC is 4.0V-DC.

4. Potentiometer P3 (Default setting 100%)

Controls the maximum hold-in voltage. Its proportional value is added to the P2 setting.

E.g.

- When P2 is set at 0% and P3 is set at 5%, the hold-in voltage of the burner relay is adjustable between 5% and 100% of the input control signal. If the input control signal is set at 0-10V-DC the hold-in voltage of the relay is 0.5V-DC.

- When P2 is set at 40% and P3 is set at 5%, the hold-in voltage of the burner relay is adjustable between 45% and 100% of the input control signal. If the input control signal is set at 0-10V-DC the hold-in voltage of the relay is 4.5V-DC.

P2%	Drop Out Volts	P3%										
		5	10	20	30	40	50	60	70	80	90	100
		Hold-in Voltage										
0	0.3	0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
10	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	
20	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0		
30	3.0	3.5	4.0	5.0	6.0	7.0	8.0	9.0	10.0			
40	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10.0				

2.6 Commissioning and Testing

2.6.6.2. Final Adjustments

1. In addition it is advisable to check the gas rate using the gas meter dial pointer. Ensure that no other appliances supplied through the meter are in operation.

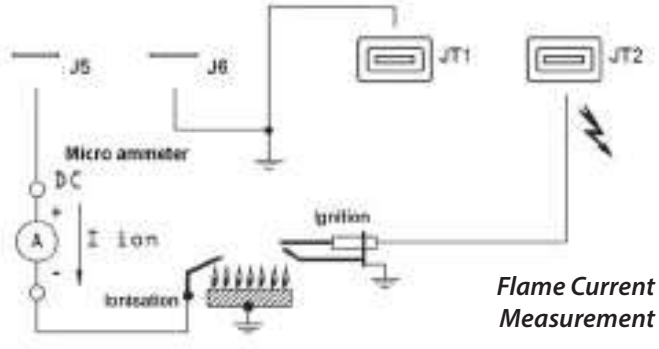
2. If required, after checking or setting the burner pressures, the CO2 content in the flue gases can be checked by sampling in the first section of flue fitted to the flue outlet of the unit. Nominal CO2 values are given for guidance in the table at the bottom of the previous page.

3. Turn on the main burner as before and test for gas soundness around pressure test joint using a leak detection fluid e.g. soap solution. Replace access panel.

2.6.6.3. Flame Current

1. To measure the flame current connect a multimeter capable of measuring micro amps as shown in the following diagram.

2. Minimum current reading is 0.5µA and normal value should be 1.5µA or higher.



Flame Current Measurement

2.6.4. Air Heater Controls

1. Close the gas service tap and ensure that the gas valve is heard to close within 1 second and that the lockout light is illuminated. Note that the heater may attempt five re-ignitions before going to lockout. Open the gas service tap and reset the unit from lockout.

2. Check that the room thermostat and all automatic controls are operating satisfactorily.

2.7 Servicing

HEM units should be serviced once per year.

It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer.

WARNING: Always switch off and disconnect electricity supply and close the gas service valve before carrying out any servicing work or replacement of failed components.

The appliance manufacturer must be consulted before replacing parts other than those specified or recommended in the servicing instructions.

Additional care must be taken if external units are serviced in wet conditions. Consideration must be given to additional requirements to maintain a safe working environment e.g. Weatherproof covers.

2.7.1. General

Full maintenance should be undertaken not less than once per year by a qualified person.

No 'specialised 'tools will be required to carry out this service.

A fault finding guide is given in section 3.1 to aid servicing.

After any servicing work has been complete, or any component replaced, the air heater(s) must be fully commissioned and tested for soundness as described in Section 2.6.

To commence servicing, firstly open the air handler compartment door.

2.7.2. Main Burner Assembly Removal

1. Ensure that the gas service valve is turned OFF and then unscrew the union nut situated immediately downstream of it.

2. Disconnect the spark and rectification leads from the control box and remove the electrical plug connections from the top of the gas control valve assembly.

3. Remove the burner heat shield, 3 screws.

4. Release the inlet connection flange from the gas valve by removing the four screws.

5. If required remove the manifold by removing the four screws securing it to the burner assembly.

6. Remove the two screws that secure the top of the burner assembly to the bulkhead and lift out burner assembly.

7. Using a stiff brush, not a wire brush, brush the burners to dislodge accumulated deposits. Inspect the burners both internally and externally to ensure that they are clean. Examine the injectors and if damaged or deteriorated, replace with new ones of the correct size and marking. If deemed necessary, clean the injectors. Do not broach out with wire.

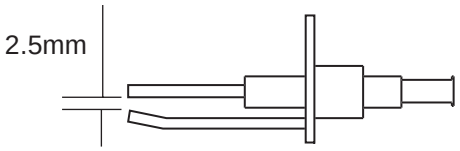
8. Inspect the heat exchanger tubes (See section 2.7.8)

9. Reassemble the injectors, manifold and burners in reverse order to that above.

2.7.3. Ignition and Rectification Electrodes

Note: The ignition electrode is located at the bottom of the burner assembly, the rectification electrode is located at the top of the burner assembly.

Inspect the electrodes, making sure that they are in a sound and clean condition. In particular check that the ignition electrode is clean and undamaged. Check that the spark gap is 2.5mm and that the rectification probe is 10 - 12mm forward of the burner.



Ignition Electrode Spark Gap

2.7.4. Heat Exchanger

Whilst the main burner assembly is removed from the unit, check that the primary sections that the burners fire into are clean.

2.7.5. Exhaust Fan

2.7.5.1 HEM 10 to 50

1. Disconnect the fan electrical connections from the main terminal strip and the air pressure sensing tube from the fan.

2. Loosen the six screws holding the main control panel, lift the control panel up and clear of the fixing position (taking care not to snag the wiring) and move to one side.

3. Remove the screws holding the fan box assembly to the exhaust header and remove the assembly.

4. Clean impeller by brushing with a stiff brush

5. Re-assemble using a new sealing gasket to the fan mounting box. Use silicon sealant around the joints.

2.7.5.2 HEM 60 to 200

1. Disconnect the fan electrical connections from the main terminal strip and the air pressure sensing tube from the fan.

2. Loosen the six screws holding the main control panel, lift the control panel up and clear of the fixing position (taking care not to snag the wiring) and move to one side.

3. Whilst supporting the fan motor remove the three screws securing the fan motor mounting plate to the fan casing and carefully withdraw the motor, mounting plate and impeller.

4. Clean impeller by brushing with a stiff brush

5. Reassemble in reverse order.

6. Re-commission the unit

2.7 Servicing

2.7.6. Replacement of Faulty Components

Only parts supplied via or authorised by Powrmatic should be used. A short list of parts and part numbers are detailed in section 3.2 of this manual. If in doubt, please contact Powrmatic.

2.7.6.1 Multifunctional Control

1. Ensure that the gas service valve is turned OFF. If a flexible gas connection has been used go to step 2 otherwise unscrew the union nut situated immediately downstream of the gas service valve.

2. Remove the electrical plug connections from the top of the multifunctional control.

3. Release the flanged connections at the inlet and outlet of the multifunctional control and remove the multifunctional control.

4. Reconnect the new valve in the reverse order to that above ensuring that the valve is correctly orientated. Renew the sealing 'O' rings if necessary.

2.7.6.2. Burners

1. Remove the burner assembly as described in Section 2.7.2.

2. Remove the end plates of the burner assembly and the central burner support plate.

3. Exchange burners as required and reassemble components in reverse order.

4. Re-commission the appliance as described in Section 2.6.

2.7.6.3. Electrode Assemblies

1. Disconnect the electrode leads from the control box as appropriate.

2. Remove the screw securing the electrode assembly to the burner assembly side plate and withdraw the assembly.

3. Fit replacement and reassemble in reverse order. Check that the spark gap is 2.5mm (See section 2.7.3) and the rectification electrode is 10 - 12mm forward of the burner.

2.7.6.4. Limit Thermostat

NB. Ensure that the thermostats are set correctly before fitment

Limit Thermostat setting is 90°C

1. Remove the screws securing the thermostat phial mounting plate to the inner bulkhead*, withdraw assembly and unclip the phial.

2. Remove the electrical connections from the limit thermostat.

3. Remove the securing nut and remove thermostat from the front panel.

4. Fit replacement thermostat in reverse order.

5. Re-commission the unit.

2.7.6.5. Exhaust Fan
2.7.6.5.1 HEM 10 to 50

1. Disconnect the fan electrical connections from the main terminal strip and the air pressure sensing tube from the fan.

2. Loosen the six screws holding the main control panel, lift the control panel up and clear of the fixing position (taking care not to snag the wiring) and move to one side.

3. Remove the screws holding the fan box assembly to the exhaust header and remove the assembly.

4. Fit replacement exhaust fan, using new gaskets and silicon sealant as necessary, and reassemble in reverse order.

2.7.6.5.2 HEM 60 to 200

1. Disconnect the fan electrical connections from the main terminal strip and the air pressure sensing tube from the fan.

2. Loosen the six screws holding the main control panel, lift the control panel up and clear of the fixing position (taking care not to snag the wiring) and move to one side.

3. Whilst supporting the fan motor remove the three screws securing the fan motor mounting plate to the fan casing and carefully withdraw the motor, mounting plate and impeller.

4. Fit replacement exhaust fan, using new gaskets and silicon sealant as necessary, and reassemble in reverse order.

2.7.6.6. Air Pressure Switch

1. Remove the two screws securing the cover and remove cover.

2. Disconnect electrical connections.

3. Pull off the sensing tube from the air pressure switch.

4. Remove the screws fixing the air pressure switch and remove switch.

5. Fit replacement in reverse order refitting the sensing tube to the negative (- or L) tapping on the pressure switch.

6. Adjust pressure switch. Dungs = 0.6mb; HUBA = 60Pa

2.7.6.7. Control Box

1. Unplug all the electrical connections.

2. Remove the two screws that secure the control box in place.

3. Fit replacement in reverse order.

3.1 Fault Finding

Fault	Cause	Action
Exhaust fan does not run	Electrical	1. Check that there is a main electrical supply present. 2. Check that all external control circuits are completed. 3. Check that high limit thermostat has not tripped - reset. 4. Check that mains voltage is present at fan motor - change fan if faulty.
No spark ignition	Electrical	1. Check full sequence is not at lockout - reset. 2. Check full sequence controls for mains supply - change if necessary. 3. Check that exhaust fan and burner air pressure switches are activated. 4. Check spark electrode and spark gap.
Burner will not light	Electrical	1. Check rectification electrode/lead/signal. 2. Check gas supply is ON.
Exhaust fan runs continuously	Electrical	1. Check overrun thermostat.

3.2 List of Parts

Item	Description		Usage	Part No.
	Gas Valve	SIGMA 843	All	145035208HL-SIT/KIT
	Gas Valve	VR4605AB	All	145035204HL/KIT
	Ignition Electrode		All	142423002
	Rectification (Flame Sensor) Probe		All	142423003
	Burner		All	142400240
	Limit Thermostat		All	142403611
	Control Box (Sequence Controller)		All High/Low All Modulation	145030846 145030847
	High/Low Governor Head		All -/HL	142466402
	Modulation Governor Head		All -/MOD	142466403
	Modulation Burner Controller (MGV)		All SINGLE units All DUAL units	142400303M 142400303M/DU
	*Alternative Modulation Driver (GM44)*		*All units*	*142400303*
	'JOX' 230V Relay		All	143000816

3.2 List of Parts

Item	Description		Usage	Part No.
	Lockout Reset Switch		All	143070276
	Pressure Switch	Dungs LGW	All	142522174
	Pressure Switch	HUBA 604	All	142522177
	Exhaust Fan		10-50	140210496
	Exhaust Fan		60 & 75	140201505
	Exhaust Fan		100	140210499
	Exhaust Fan		110-150	140201503
	Exhaust Fan		175	140201502
	Exhaust Fan		200	140201507
	Brahma to Pactrol Replacement Kit for Single HEM-NVX OR HEM-SL Units		NVx: 10-100 SL: 30/6-75/9, 100/12	145030847/KIT/HEM
	Brahma to Pactrol Replacement Kit for Diual HEM-NVX OR HEM-SL Units		NVx: 110-175 SL: 75/15, 90/18 125/15-200/24	145030847/KIT/ HEM/DUAL

Appendices

Appendix 1: HEM-NVx Information required for ecodesign (ErP) Directive 2009/125

Model			10-3	15-4	18-5	25-5	30-6
Rated Heat Capacity		kW	9.6	14.5	17.7	23.6	27.4
Minimum Heat Capacity		kW	5.0	9.8	11.9	15.7	18.2
Gross Efficiency	High Fire	%	80.0	81.0	81.0	81.0	81.0
	Low Fire	%	81.0	81.0	80.0	80.0	80.0
Nett Efficiency	High Fire	%	88.8	89.9	89.9	89.9	89.9
	Low Fire	%	89.9	89.9	88.8	88.8	88.8
Seasonal Efficiency Nett		%	89.4	89.9	89.4	89.4	89.4
Effective Heat Generator Seasonal Efficiency	HiLo	%	91.4	91.9	91.4	91.4	91.4
	Mod	%	92.4	92.9	92.4	92.4	92.4

Model cont.			40-8	50-6	60-7	75-9	100-12
Rated Heat Capacity		kW	36.0	44.8	54.2	67.6	91.9
Minimum Heat Capacity		kW	23.2	29.0	36.4	49.6	62.5
Gross Efficiency	High Fire	%	80.0	81.0	81.0	80.0	80.0
	Low Fire	%	80.0	80.0	81.0	79.0	79.0
Nett Efficiency	High Fire	%	88.8	89.9	89.9	88.8	88.8
	Low Fire	%	88.8	88.8	89.9	87.7	87.7
Seasonal Efficiency Nett		%	88.8	89.4	89.9	88.2	88.2
Effective Heat Generator Seasonal Efficiency	HiLo	%	90.8	91.4	91.9	90.2	90.2
	Mod	%	91.8	92.4	92.9	91.2	91.2

Model cont.			110-13	125-15	150-18	175-21
Rated Heat Capacity		kW	98.0	112.0	134.9	154.4
Minimum Heat Capacity		kW	66.0	76.5	78.8	112.8
Gross Efficiency	High Fire	%	80.0	80.0	79.0	80.0
	Low Fire	%	81.0	80.0	81.0	82.0
Nett Efficiency	High Fire	%	88.8	88.8	87.7	88.8
	Low Fire	%	89.9	88.8	89.9	91.0
Seasonal Efficiency Nett		%	89.4	88.8	88.8	89.9
Effective Heat Generator Seasonal Efficiency	HiLo	%	91.4	90.8	90.8	91.9
	Mod	%	92.4	91.8	91.8	92.9

Appendix 2: HEM-SL Information required for ecodesign (ErP) Directive 2009/125

Model			30-6	45-9	50-6	60-12
Rated Heat Capacity		kW	27.0	40.5	45.0	54.2
Minimum Heat Capacity		kW	15.0	23.5	23.9	36.4
Gross Efficiency	High Fire	%	79.0	79.0	79.0	79.0
	Low Fire	%	82.0	81.0	81.0	81.0
Nett Efficiency	High Fire	%	88.0	88.0	88.0	88.0
	Low Fire	%	91.0	90.0	90.0	90.0
Seasonal Efficiency Nett		%	89.4	88.8	88.8	88.8
Effective Heat Generator Seasonal Efficiency	HiLo	%	91.4	90.8	90.8	90.8
	Mod	%	82.4	91.8	91.8	91.8

Model cont.			75-9	75-15	90-18	100-12
Rated Heat Capacity		kW	68.5	67.5	80.4	88.7
Minimum Heat Capacity		kW	44.6	41.5	41.6	62.4
Gross Efficiency	High Fire	%	80.0	79.0	80.0	82.0
	Low Fire	%	80.0	81.0	80.8	82.0
Nett Efficiency	High Fire	%	88.8	87.7	88.8	91.0
	Low Fire	%	88.8	89.9	88.8	91.0
Seasonal Efficiency Nett		%	88.8	88.8	88.8	91.0
Effective Heat Generator Seasonal Efficiency	HiLo	%	90.8	90.8	90.8	93.0
	Mod	%	91.8	91.8	91.8	94.0

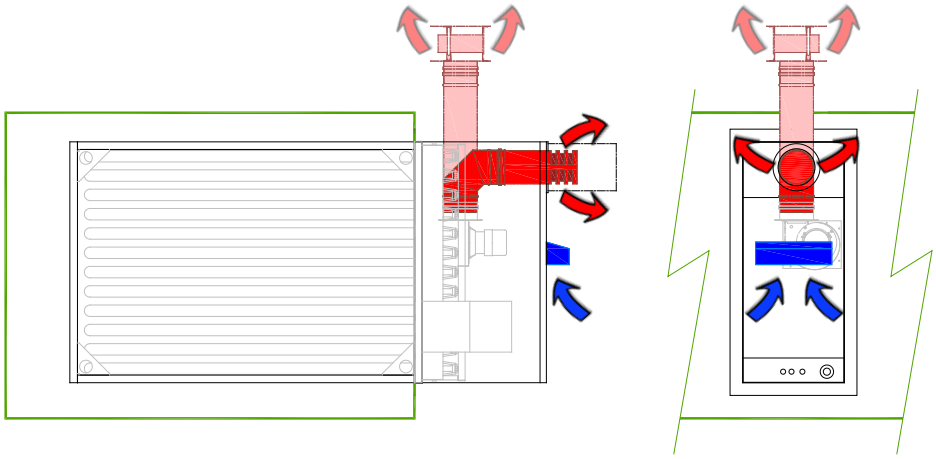
Model cont.			125-16	150-18	175-21	200-24
Rated Heat Capacity		kW	116.7	135.7	160.8	178.3
Minimum Heat Capacity		kW	70.5	79.9	82.6	108.3
Gross Efficiency	High Fire	%	82.0	80.0	79.0	78.0
	Low Fire	%	83.0	80.0	84.0	81.0
Nett Efficiency	High Fire	%	91.0	88.8	87.7	86.6
	Low Fire	%	92.0	88.8	93.2	89.9
Seasonal Efficiency Nett		%	91.6	88.8	90.5	88.2
Effective Heat Generator Seasonal Efficiency	HiLo	%	93.6	91.8	92.5	90.2
	Mod	%	94.6	91.8	93.5	91.2

Appendices

Appendix 3: Flueing and Ventilation Requirements for 'Stand alone' units.

The following notes and sketches refer to Fluing/Combustion Air and Ventilation requirements for modules fitted as 'stand alone' applications and not within a secondary housing or AHU.

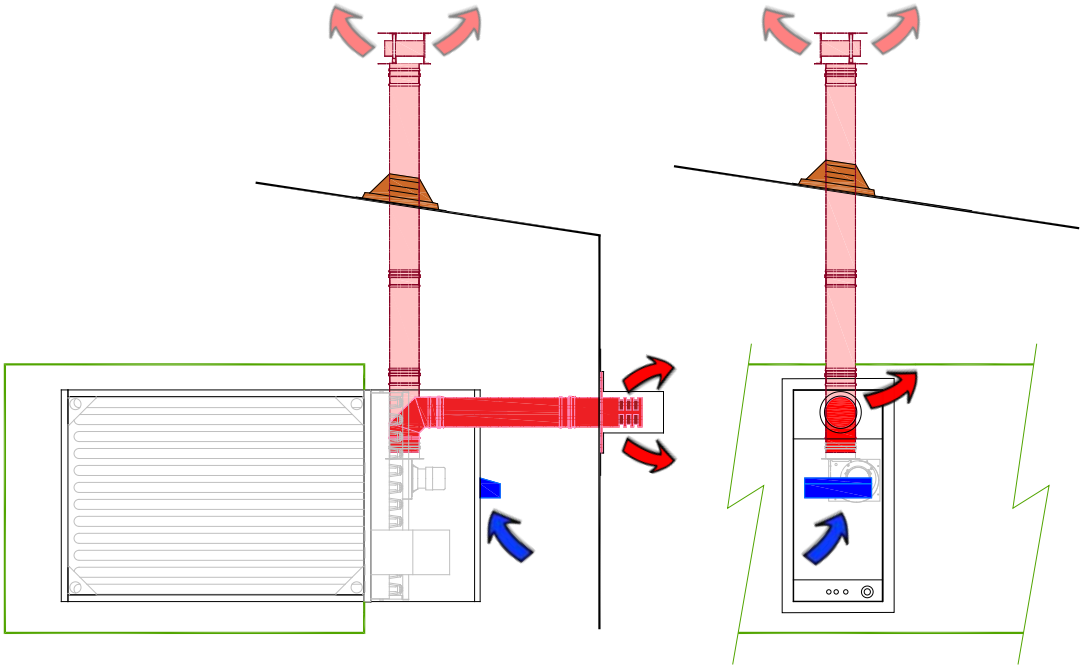
1. Single Module - External



Notes

Stand alone application (ie HEM not within a secondary housing/ahu etc) External location HEM-SL & HEM-NVx. Single module c/w Powrmatic burner enclosure. Combustion air to Powrmatic burner enclosure via Powrmatic combustion air intake grille No specific ventilation requirements - external location. No specific combustion air requirements - external location. Flue can be front or top. Module supplied with Powrmatic flue terminal and flashing Care must be taken to ensure that flue exit point is not in proximity of windows/doors If necessary flue to be extended to a point where it has clearance from windows/doors.

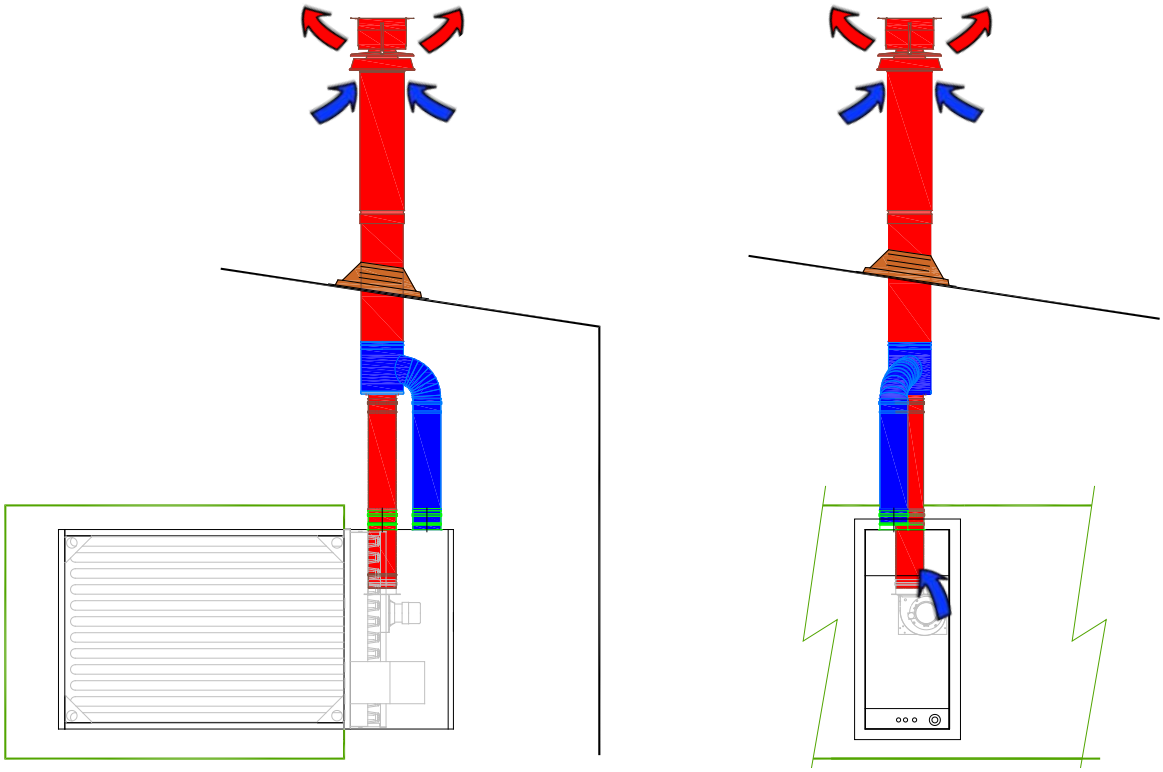
2. Internal (Non Plant Room) Flue Only



Notes:

Stand alone application (ie HEM not within a secondary housing/ahu etc) Internal location HEM-SL & HEM-NVx - within open space (ie not plant room) Single module c/w Powrmatic burner enclosure. Combustion air to Powrmatic burner enclosure via Powrmatic combustion air intake grille Combustion air to space where module is located in accordance with BS6230. Flue can be front or top. Module terminates with flue spigot for onward connection by others Module installed in 'flue only' mode. Powrmatic approved flue to be used.

3. Internal (Non Plant Room) Room Sealed

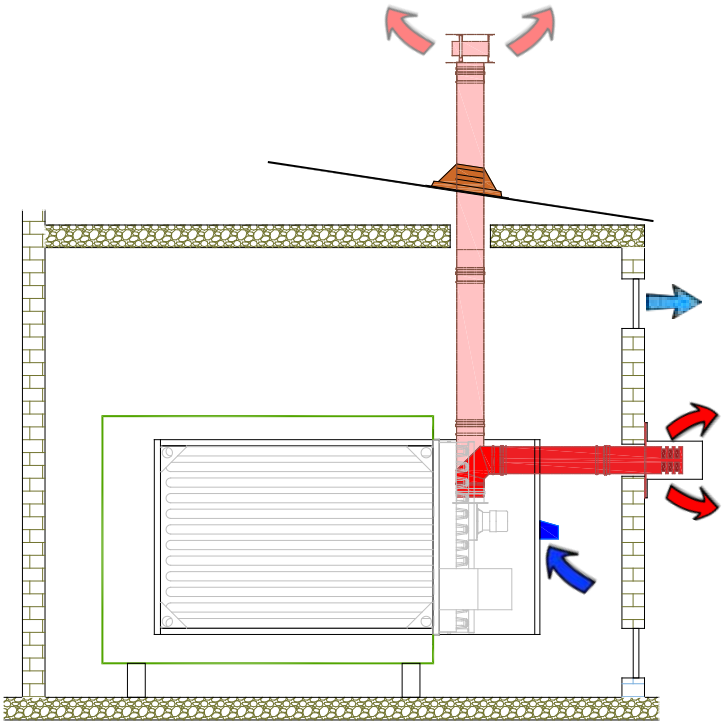


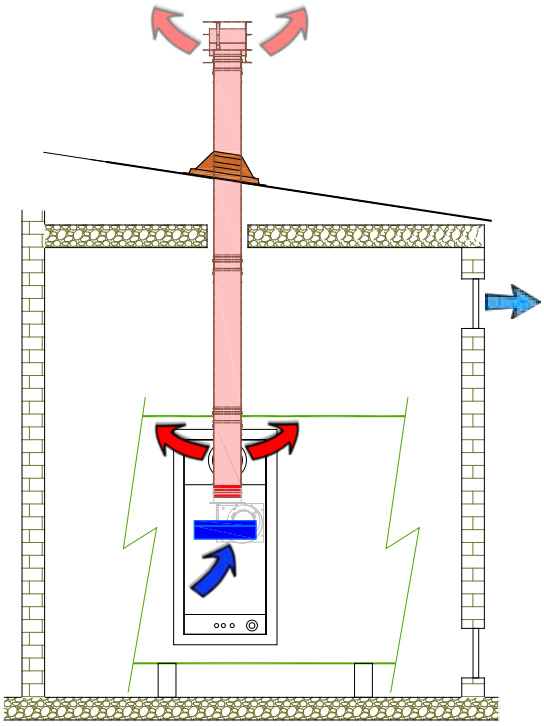
Notes:

Stand alone application (ie HEM not within a secondary housing/ahu etc) Internal location HEM-SL & HEM-NVx - within open space (ie not plant room) Single module c/w Powrmatic burner enclosure. Combustion air to Powrmatic burner enclosure via Powrmatic combustion air intake grille. Combustion air to space where module is located in accordance with BS6230. Flue can be front or top. Module installed in 'room sealed' mode. Powrmatic approved flue to be used.

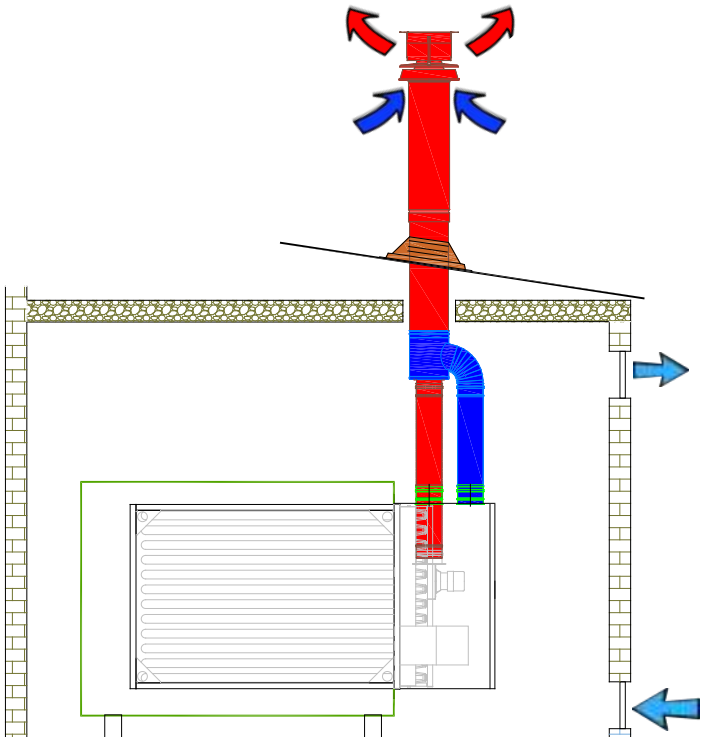
Concentric flue terminals are not available on models 150m, 175 & 200

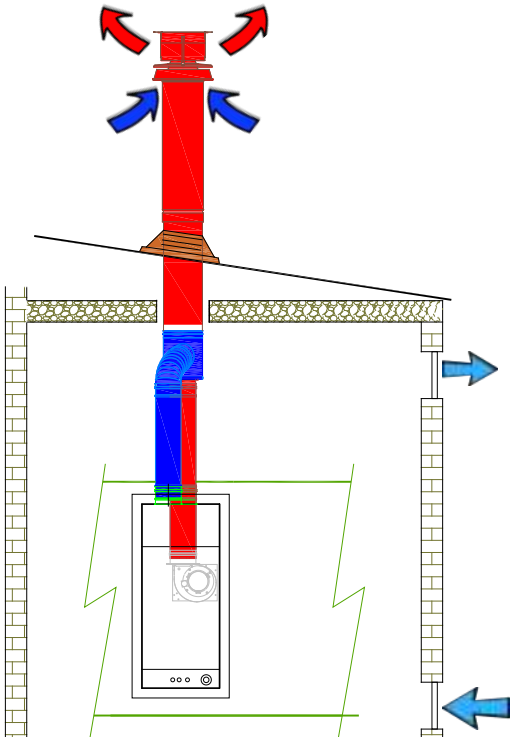
4. Internal Within Plant Room - Flue Only





5. Internal Within Plant Room - Room Sealed





Notes

Stand alone application (ie HEM not within a secondary housing/ahu etc). Internal location HEM-SL & HEM-NVx - within a plant room as defined by BS6230 Single module c/w Powrmatic burner enclosure. Combustion air ventilation requirements in accordance with BS6230 Plant room ventilation in accordance with BS6230. Flue can be front or top. Powrmatic approved flue to be used.

Flue only units - Combustion air to Powrmatic burner enclosure via Powrmatic combustion air intake grille.

Room Sealed units - Discharge and return air to appliance must be positively ducted.

Concentric flue terminals are not available on models 150m, 175 & 200

Notes:

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TESTED

STAGE 1	**Full mechanical, construction, assembly and electrical sequence check**	☐
STAGE 2	**Full functional test in accordance with Quality System Procedures**	☐

Heater Model _____

Heater Serial No. _____

Type of Gas _____

Final

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More information is available from our website by scanning the following QR code.

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